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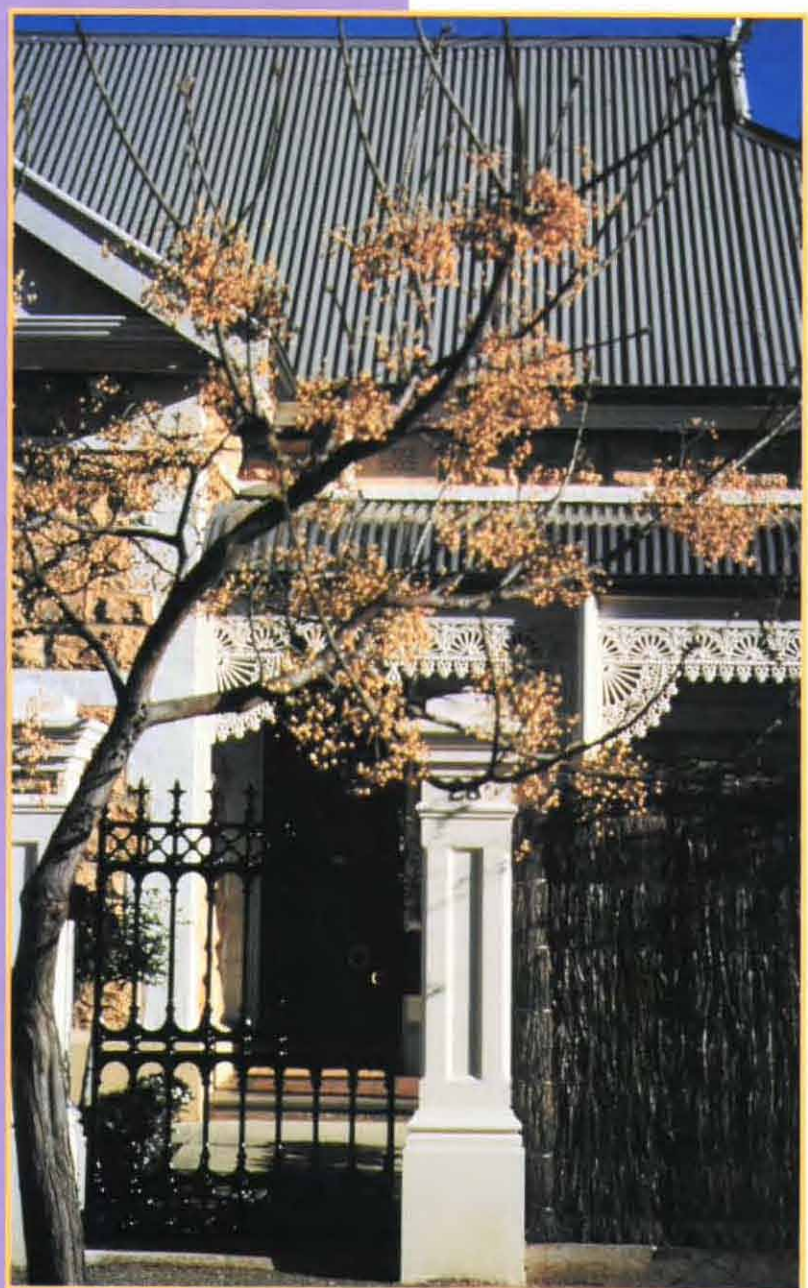

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PAINTING OF OLDER BUILDINGS IN SOUTH AUSTRALIA

City of Adelaide

Heritage South Australia
Government of South Australia

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1 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 secandly, it affects the way we regard a building. It influences our attitude. Colour has a very strong and immediote impact and, as a design tool, can establish or reinforce architectural form ond 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 informotion is included for interest, references for further reading have been given for those areas which are known to be well covered by other publicotions.

There are severol 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 on oppropriate colour scheme for an older South Australian building should take into account its culturol significance, history, materials (building fabric), and use as well as its cantext.

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

Since the 1970s there has been an increasing awareness of the value of appropriate paintwork on older buildings. Information has become mare widely available in the farm af publications on the subject as well as guides developed by paint manufacturers[2]. The range of colours now available is vast and the possible colour schemes are therefore endless. Nonetheless, there has been a grawing 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 o building. Most often it is a somewhat clumsy, loase use of certain standard ranges of colours.

The colours themselves, within these ranges, moy have been arrived at by investigotion 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 oll 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 'heritoge' misconceptions, and to provide o bosic 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 quolity 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 awn merits, and an attempt made to arrive at an appropriate solution for that building.

It is haped that with increased sensitivity to the nuances af calaurs ond their cambinatians that the repainting of alder buildings, and, so, the altering af the streetscape, will pravide varied delight and cantribute ta aur angaing architectural heritage.

Adapting an approach

Frequently a property awner needs ta paint a building an which there is na evidence af farmer calaurs. Paint fram timberwark may have been remaved entirely, and the walls and quainwark 'cleaned' ta substrate at same time in the building's histary.

In this situatian there are twa camman and diverse respanses. One is the adaptian af a standard 'heritage' calaur scheme. This invalves strict adherence ta the applicatian af limited and standard calaurs, identified as having been in use when the structure was completed – usually in the nineteenth century.

The other is ta adapt a subjective appraach, emplaying personal likes and dislikes in calaur.

Adapting the first, and mare limited, appraach denies the fact that ariginally there wauld have been considerable subtle variatian in calaurs. The calours were generally mixed an site by competent painters wha, while canforming ta accepted practices and aesthetics af the time, were required ta shaw initiative.

This appraach alsa denies the spirit at the time, which was ta embrace advances – new calaurs were continually being accepted and incarparated.

Taking the mare arbitrary appraach 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 ta the cultural heritage af that building.

Cultural significance

Cultural significance is the value of the property to present and future generatians. The cultural significance of the property is invariably given tangible expression in, and represented by, the physical material af the praperty. Changes ta this material such as pointing can remove ar amend that cultural significance, and its appreciatian. It is therefare impartant that planning far change allows far a detailed understanding of significance.[3]

The first twa steps in arriving at a mare appropriate approach are:

1. ta ascertain why a building is histarically impartant, and haw this is reflected in the extant fabric;

2. ta develop palicies which will assist in its canservatian. These palicies wauld relate ta preservatian and maintenance.

The approach to repainting will naturally be directed by thase palicies.

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

'Preservation' means maintaining the fabric af a place in its existing state ta retord further decay ar deteriaratian.

Preservation needs shauld be identified in the pracess af planning, and it may well be that particular areas af craft; ar decaration; ar evidence af porticular patterns af use; ar histarical assaciatian need ta be preserved intact.

'Maintenance' means the cantinuaus pratective care af the fabric and its setting, ond is mare similar ta the pracess af preservatian than the pracess af repair:

- prepare a specific maintenance schedule for the place;
- avaid unnecessary replacement and repair;
- avaid the use af modern materials just ta reduce maintenance cycles.

A heritage listed property

A heritage listed praperty will have had its value defined in aesthetic, historic, scientific ar sacial 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'.[4]

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 cammunity 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 approoches to painting a building of such age, style, construction, use ond locotion may also be taken into account. Publications on the repainting of buildings of different eras are readily available and same are listed at the back af 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, ar 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 voriotion 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 considerotion to retoin 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 verondahs ond 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 oppropriotely on genuine old stock.

A contemporory 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 moy speak of todoy and still be respectful to on 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 farm, 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:

1. *Howard Tanner and Philip Cox, Restoring Old Australian Houses & Buildings: an Architectural Guide, Macmillan, Melbourne, 1975, p. 138.*
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 pointwork.

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.'[1]

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. [2]

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 share of roof. The walling 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. [3]

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

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 flagged 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. [4]

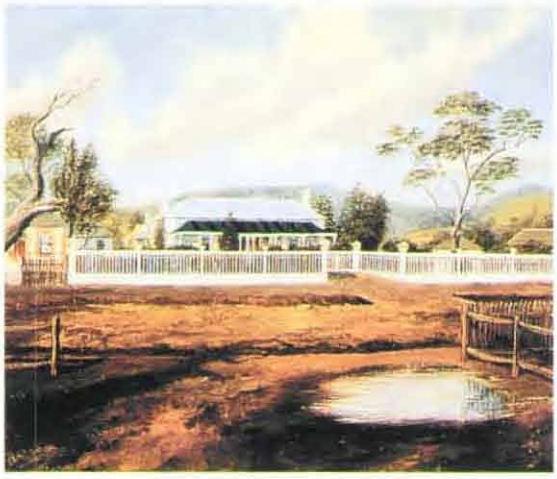
The recipes for this varied considerably. Examples of limewash recipes are given in Appendix 10.4.

'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.' [5]

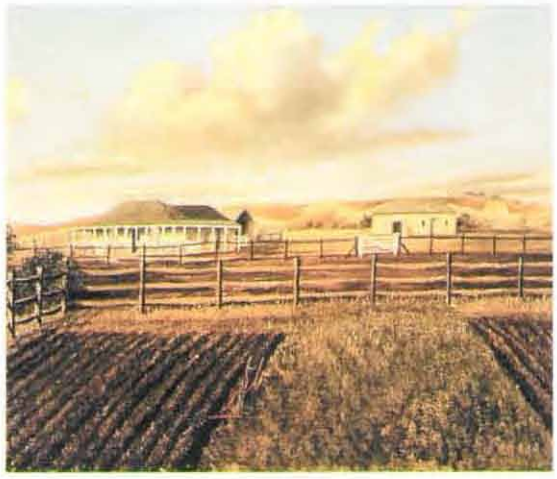
Of the earlier timber buildings, the light-framed cottages made of softwood were originally painted to protect them from deterioration. Early colour schemes were very simple.

Piccadilly Valley, early settler's hut.

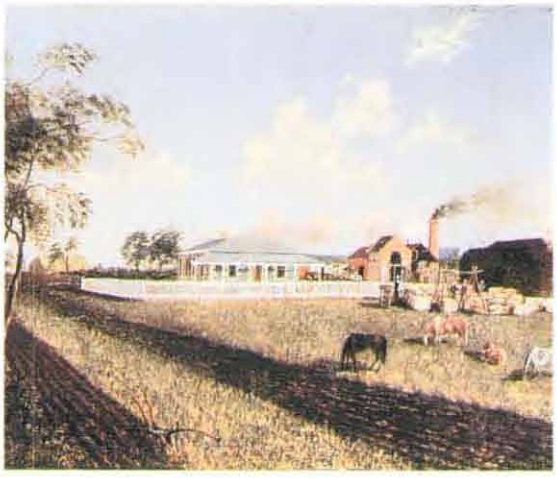
Materials such as stone, bricks, galvanised roofs, shingles and slates were often left unpainted. The appeal of such natural finishes can be appreciated in the works of painters of the times, such as James Shaw (1815-1881).



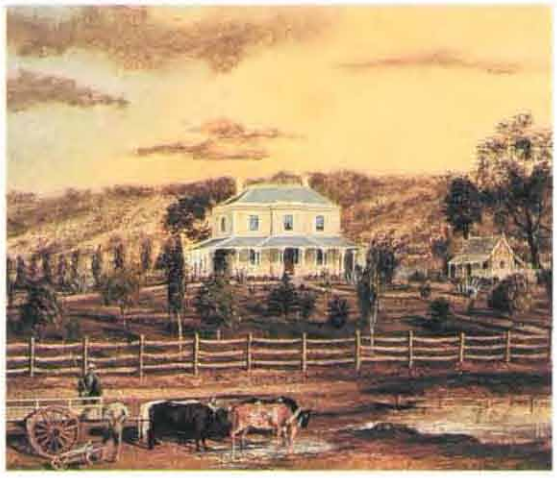
A house in Osmond Terrace, Norwood
Source: Art Gallery SA



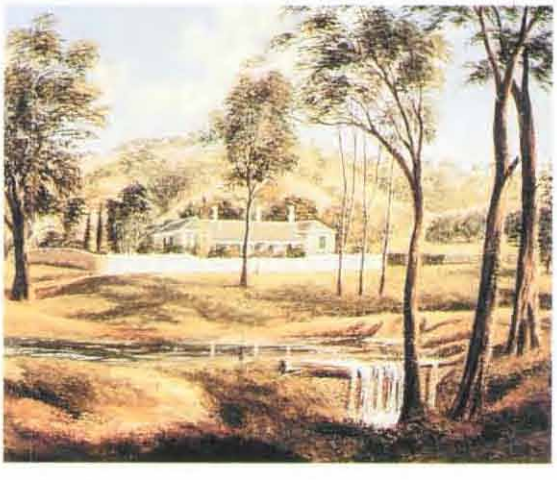
Smith Homestead, Smithfield
Source: Art Gallery SA



The Tannery
Source: Art Gallery SA



Hasling House, Mitcham
Source: Art Gallery SA



Myrtle Bank
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.

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 brick-works 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.[6]

This once necessary practice has remained characteristic of many South Australian buildings.

From 1836 local bluestone was in use, as was limestone, and after 1855 the sandstone, which is so characteristic of South Australia, became popular.

Sandstone is a sedimentary rock composed predominantly of quartz (sand) grains, though many have high proportions of feldspar and clay. The natural elements that bind the granular material include silica, clay, calcium carbonate and iron oxide.

Sandstones are generally light-coloured off-whites, creams, and pale pinks and browns. They often show stronger colours associated with iron-oxide figuring, which, unlike bluestones, is dispersed through the body of the stone and gives rise to banding and wavy patterns which are often mistaken for the natural bedding of the stone. Sandstones can sometimes be distinguished from each other on the basis of grainsize: many nineteenth-century (hand-dressed) stones were very coarse grained (e.g. Mitcham and Mt Lofty sandstones) while more recent (sawn) stones are finer grained (e.g. Basket Range in the Adelaide Hills where building sandstones are still worked).[7]

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'.

Neutrol colours such os chorcool ond creom, together with earth colours, have been used for mony yeors in combinotion with South Austrolion sondstane. Not only ore the colours understated, ollowing the stone to feature, but the tonol voriotion thot is possible ollows interest from odequote controsts. The moteriols used to ochieve these colours are stoble ond long lasting. Arguobly, this is o most successful combinotion of colours ond moteriols ond one that is distinctively South Austrolion.

It is o logicol solution. Apart from suiting the locol moteriols, such neutrol colours were populor in the nineteenth century in mony parts of the world. Lighter colours ore still the most durable becouse they reflect ultroviolet light ond heot.

Roger Moss, co-outhor of 'Victorion Exterior Decorotion', is quoted in on American publicotion on exteriar point colours: 'One af the most popular calar combinotions of the 19th century wos grey ond white. It wos easy to mix, easy to touch up ond it stood up well'.[8]

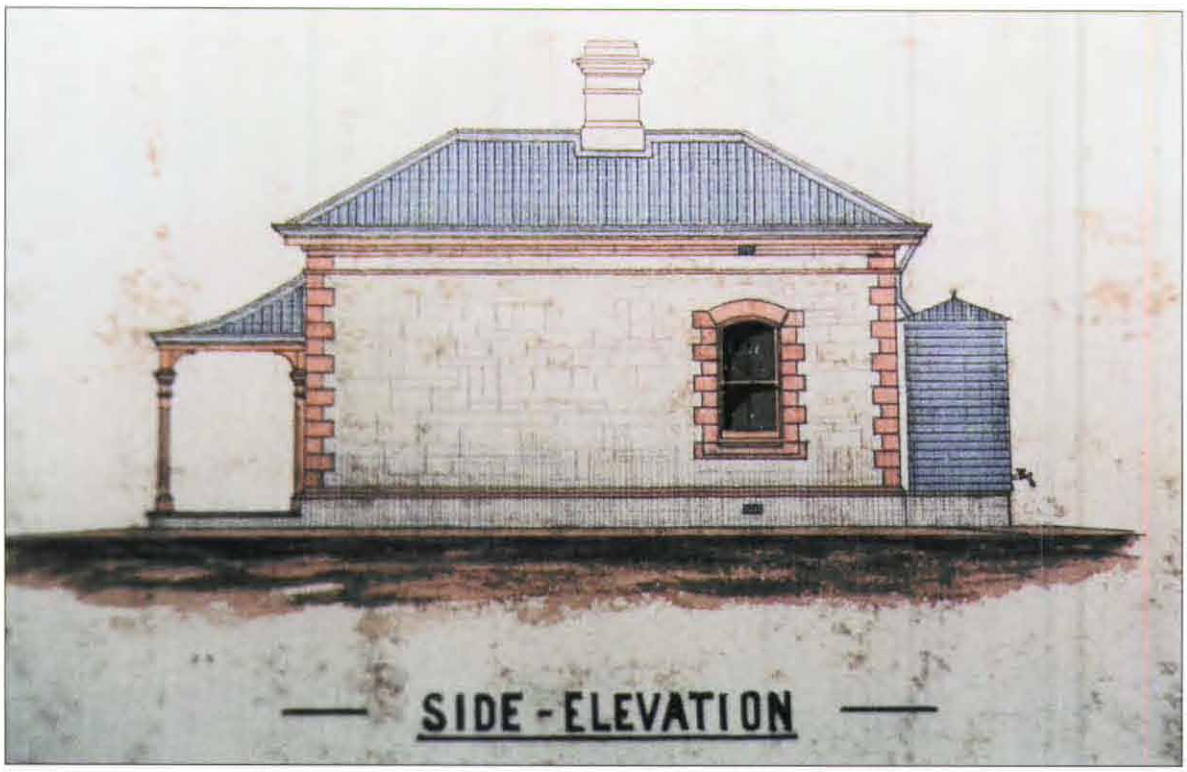
An indicotion thot grey hos been, ond cantinues to be, o populor calaur for roofs in Sauth Austrolio is apporent in the foct thot the Colorbond (a commonly used, precoloured roofing moteriol) colour 'Slote Grey' is o stondord colour in this Stote but not in the ather Stotes.

Note: Eorly specificotions relating to the painting of buildings, porticulorly domestic buildings, cammonly referred to the number of coats of point to be applied, for exomple two coots. Reference wos olso mode to the number of shodes (meaning colours), for exomple three shodes; ond even ot times ta the monufocturer af paint or vornish ta be used, but often not to the octuol colours. Beautifully penned in langhond, such specificotions as those of the Adelaide orchitect, Tillett, ot best mention 'opproved shodes'.

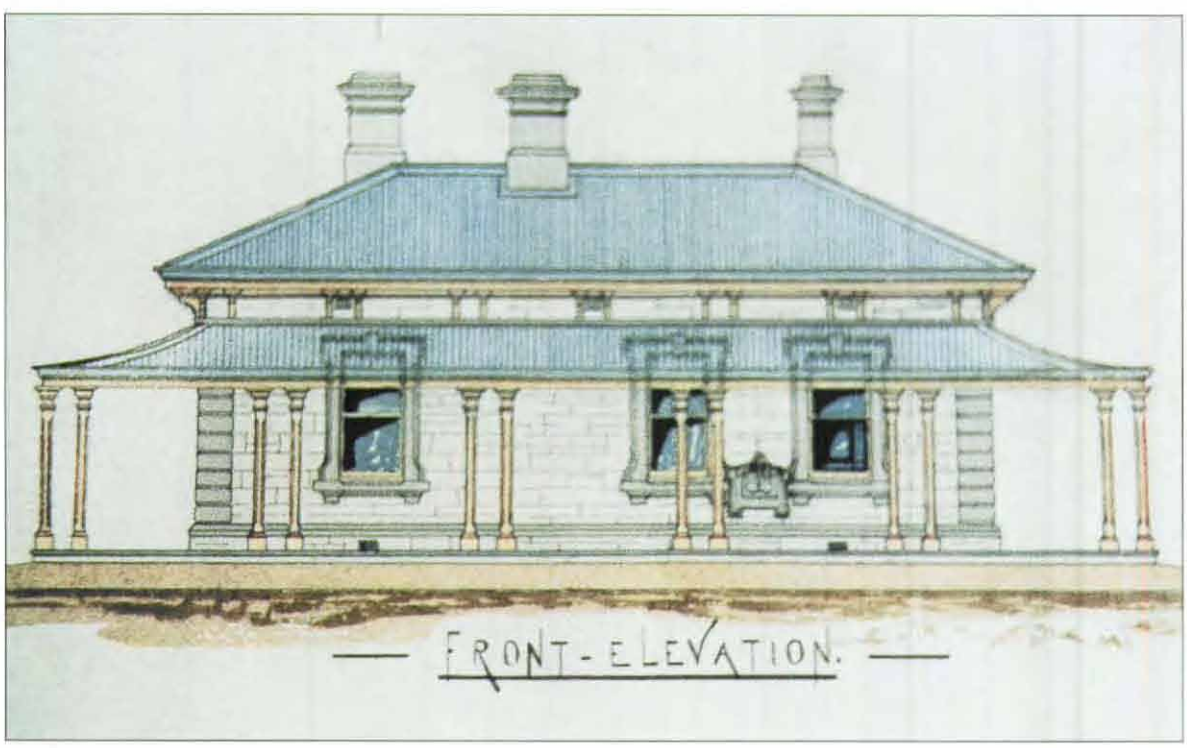
'All white leod to Johnsan's or oppraved ond oils ond stoiners of best quolity. Vornish to be Turner's best corrioge.'
Compbelltown Methodist Church by J.A. Tillett.

'All outside ond inside woodwork where showing to be pointed in three coots Berger's point of oppraved shodes.'
Methodist Sundoy School, c.1903, Tillett.[9]

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.



Appila, Yarrowie Post and Telegraph Office
Source: Australian Archives



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

Burra Post Office
Source: Australian Archives

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.[10]

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-storeyed 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.[11]

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.[12]
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 exoggeroted displays of colour were usuolly ossocioted with the gronder buildings of the time. South Austrolio hos fine exomples of such decorotion but *'despite some grond buildings, boom period architecture in Adeloide wos not os flamboyont os in wealthy Melbourne.'* [13]

Freelond writes of the High Victorion excessive love of voluptuousness, ond then observes:

Only in South Austrolio wos there o significont local develapment ot voriance with the generol trend. South Australion orchitecture of the 80s wos comparatively direct ond simple, lorgely ovoided shom ond was strongly regionol in its expression.[14]

Regionol differences were opporent in such moteriols as cost iron, which wos widely used as decorotion (and often pointed in dork colours).

It remoined lighter ond more refined, ond its pottern wos generolly more geometric in South Austrolia, where supplies continued to come from England. In comparison, the cost iran produced in New South Woles ond Victario wos considered clumsier ond more florid in design.[15]

The notion of refinement is taken up by F.W. Dancker, on early orchitect of Covendish Chambers, Grenfell Street, Adeloide. In his 1904 book, *Modern Dwellings – 100 Selected Designs*, he reveals his own inclinotions, ond perhops reflects locol ottitudes of the time, when he writes:

During the last decode mony well-plonned and ortistically treoted residences hove been erected oround the city which have evidently called forth the study of ort ond the planning of buildings with o tendency towords purity of design, showing on oppreciotion of oll that ministers to comfort ond luxury, ond adding every year to the veritable houses of ort exhibiting refined toste ond oesthetic ospirotion, with which moy be controsted o sprinkling of goudily coloured structures, whose cheap and eccentric features scream oloud for attention.

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

Miles Lewis ond Alisan Bloke in the publication *Exterior Point Colours* (A Guide to Exteriar Colours for buildings of the Victarion Period), published in 1977 os o Technicol Bulletin of the Notianol Trust Of Austrolio (Vic), list the following colours:

1. Off-White
2. Cream
3. Light Stone
4. Light Brown
5. Rich Brown
6. Indion Red
7. Purple Brown
8. Dork Green
9. Prussion Blue
10. Light Green
11. Block
12. Slote Grey

they then indicote that on wolls only Cream and Light Stone were oppropriote (with Light Stone, Rich Brown ond Indion Red included for 'restricted use'). More colours were suggested os being oppropriate for joinery ond signwriting, namely: Off White, Cream, Light Stone, Light Brown, Rich Brown, Indion Red and Purple Brown (with Dark Green, Prussion Blue ond Block included in the 'restricted' cotegory).

For roofs the nominoted appropriate colours were limited to Light Stone, Indian Red ond Slote Grey. The orgument given is thot olthough other colours were ovoiloble, they were more expensive ond so presumobly less common.

Striping wos o proctice imported from Englond early in the nineteenth century ond which remained current until ofter 1900. Both verondohs ond moin roofs were striped, but striping wos much more camman for the former. The colours most cammanly used were Indion Red ond White (or Off-White) but cream wos olso used for the light stripes ond greens ond browns were probobly used for dork stripes. Individuol stripes were not usuolly greoter thon the width af o sheet of corrugoted iron less overlap – thot is, not more thon obout 80 cm.[16]

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 Theary 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 micaceaus 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.[17]

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 tile contrasted greatly with both grey slate and with iron, which was generally used as roofing material.

Aesthetically, the sallow 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.[18]

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.[19]

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.'[20]

Freeland comments on Californian bungalows generally that the colour 'instead of hot redness was dark greys 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'.[21]

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.

Adelaide sandstone bungalow

'Fadeless Green' now called 'County Green' 1366

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.[22]

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.

Generolised period colour schemes ore not necessorily bosed on locol informotion. It is desirable thot evidence that is uncovered in this Stote be preserved ond documented.

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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

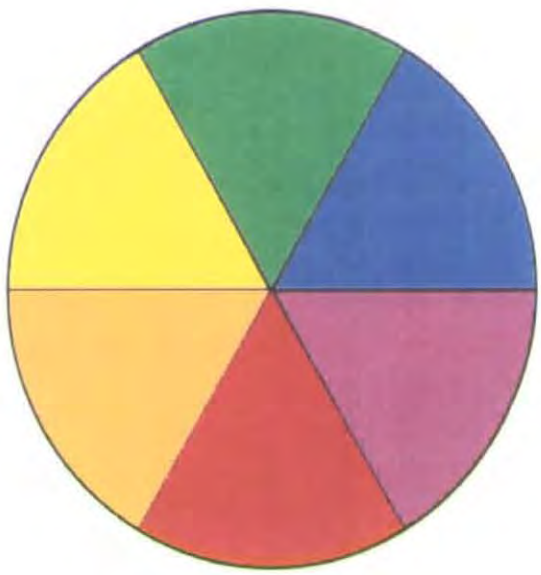
Light is required before colour may be perceived. The visible energy that the human eye is adapted to receive is composed of different wavelengths. We associate these wavelengths with different colours. The retina of the eye receives the energy, which, as a nerve signal, is transmitted to the brain, 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'.[1]

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.[2]

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.

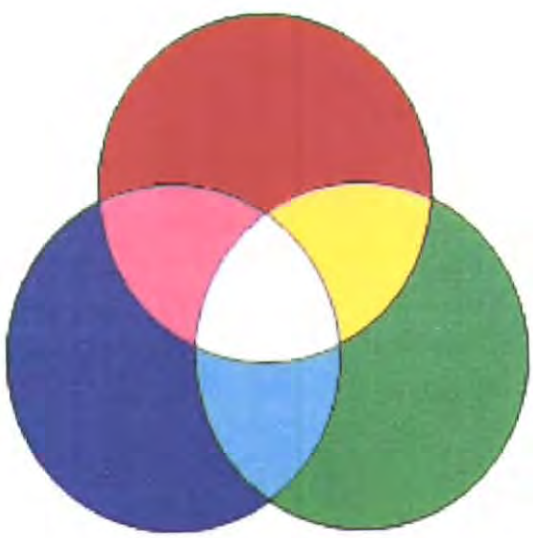
Holtzschue writing about Primary and Secondary colours made the following points:

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.

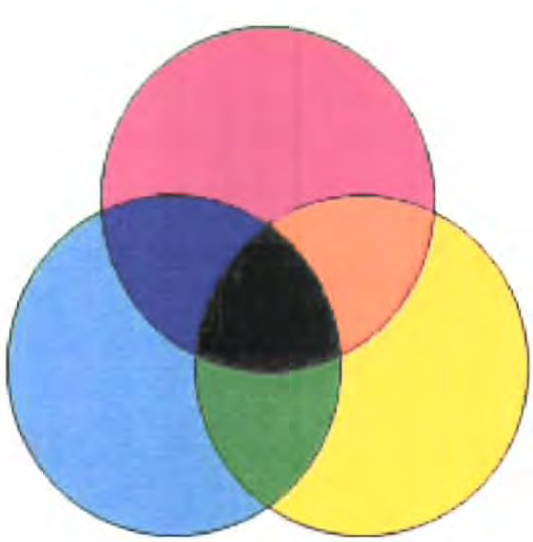
Green, orange and violet are the secondary colors. Each is the visual midpoint between two primary colors - an even interval between two primary parents. A secondary hue is visually 50 per cent of the primary on either side of it.

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.[3]

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.[4]



Additive process



Subtractive process

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.[5]

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

Opaline Green

Dulux Juniperberry

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.[5] 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.

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 façades.

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.[7]

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 cambination of complementaries; far example, R and G (which is compased of B+Y); B ond O (R+Y) etc.

Ta be a successful combinatian the calours do not have to be obvious and, althaugh thearetically there are ideal praportians far each camplementary pair, the contrasting amount of a porticular colaur 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 predaminant hue, relatively small areas of o green (such os Brunswick Green) wauld be sufficient ta be successful.

As well as the complementary colours, ather arrangements of hues are considered forms of colour harmany (see illustratian following page).

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

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

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

Warm and caol colours

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

The colaurs of moterials used on older buildings, for exomple stone and brick, were usually warm, and the colours more common among the first paints were largely earth colours, which were alsa warm. Perhaps because of these foctors, some calour schemes in South Australia lack balance between warm and cool hues. Examples abound of warm schemes that ore 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 impressian is ane of heat ond discamfort.

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

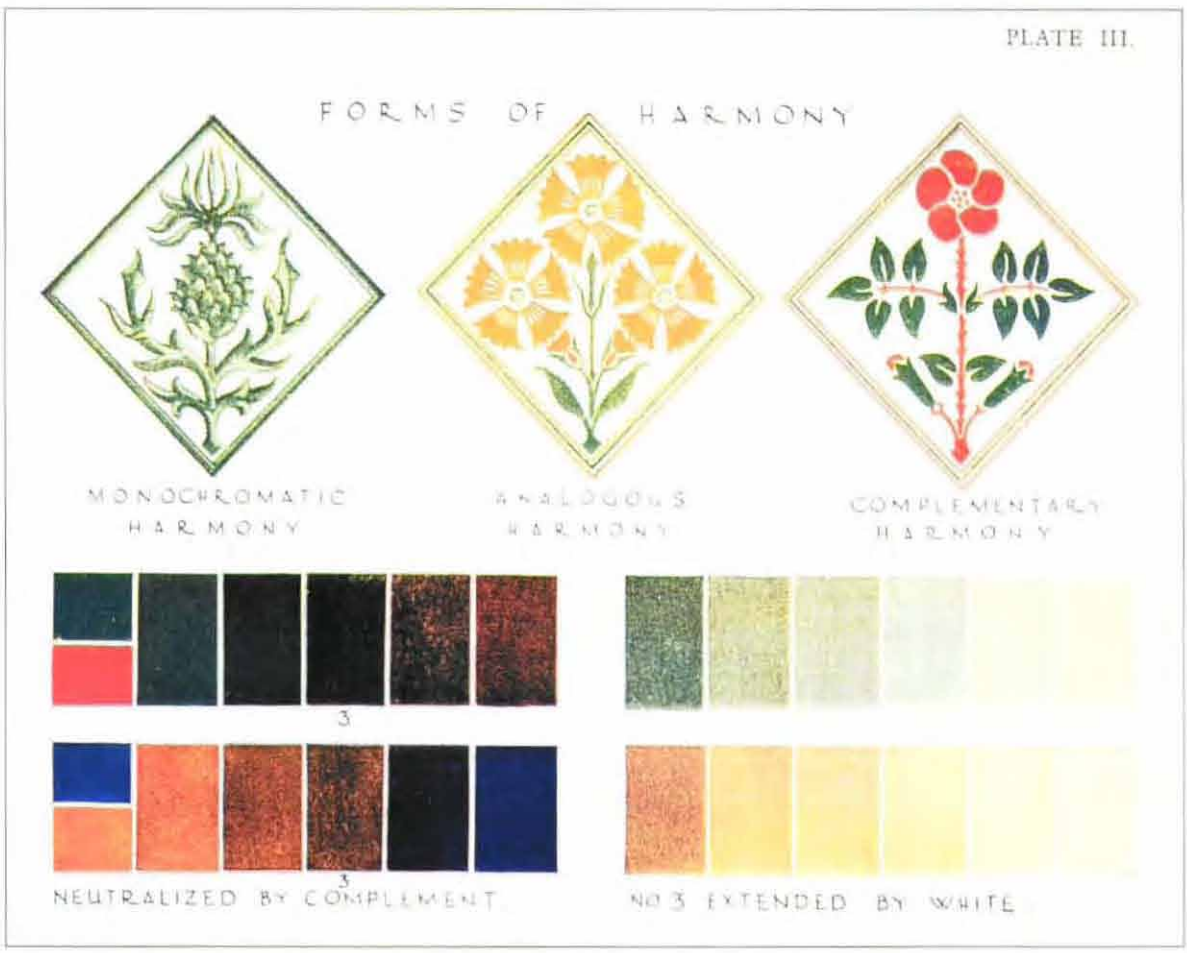
In instonces where evidence of on originol scheme is lost, and it is appropriate to apply colour schemes that were typical far a given era, it should be noted that many suggested colour schemes have originated from the Eastern States. Colour combinations which are successful on a building which hos a 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 Sauth Australia.

'Brunswick Green', as well os now being used indiscriminately on many reproduction buildings, accurs in many recommended schemes for older buildings.[8]

Said to have originally been developed os a colaur '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 landscope and particulorly unsuitable far hiding Australian dust.[9] It is, nevertheless, an impartant component of many original colour schemes, and often successfully offers a cool element in otherwise predominantly worm schemes.

Cool colour schemes, which ore not tempered by at least a small contrast of o warmer colour, can be similarly unsotisfying.

In the same way thot lighter colours appeor to 'advance' or come forward relotive to darker ones, warm colours advance relotive to cool ones (and saturoted or intense colours advonce relative to subdued ones).[10]



'Forms of Harmony' illustration. Source: The Practical Painter and Decorator Virtue, London, 1948. Plate 111

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.

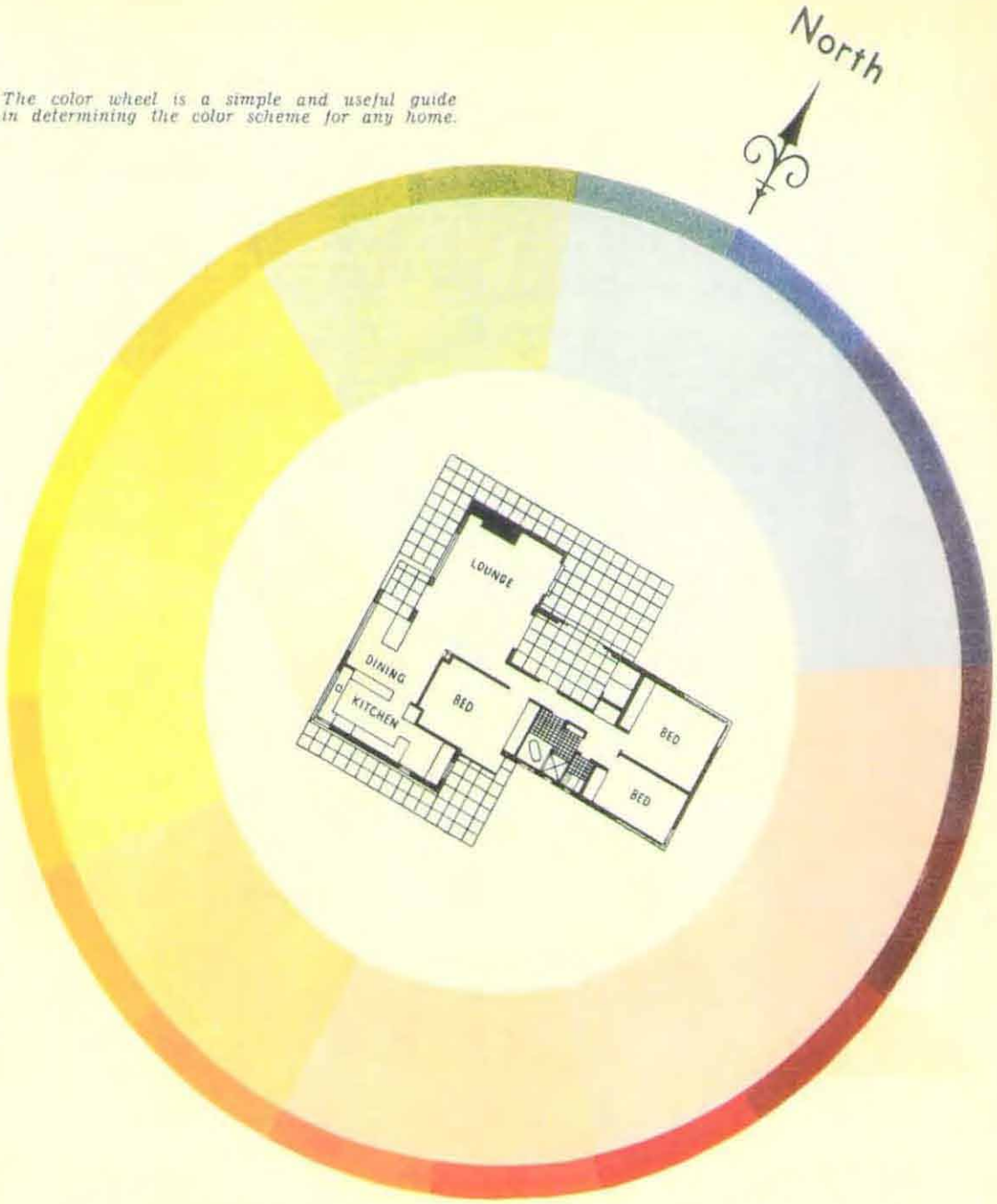
The orientation of a building can have a bearing on the selection of warm and cool paint colours for interiors. In essence, warm colours are best employed on the cool side of the building, whereas the warmer side can benefit from cooler colours.

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.[11]

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.

16

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. There can be a sense of being led, or invited, in.

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.

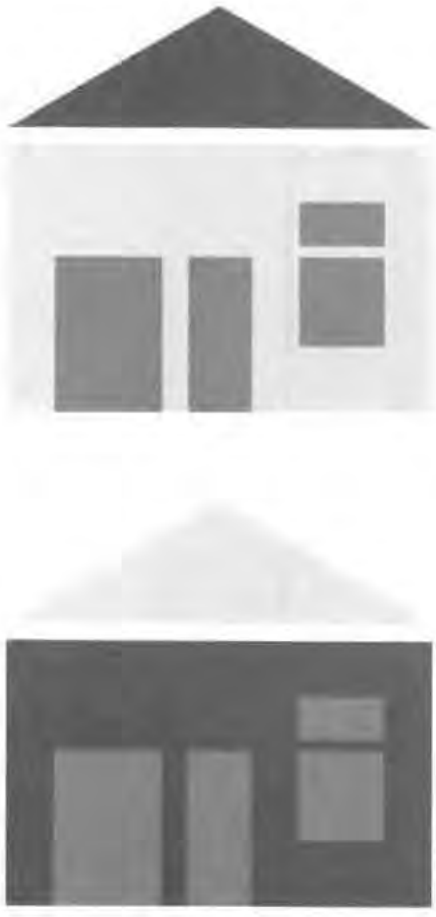
Darning employs the same principle. Selecting a sewing thread that has the same value as the item to be mended is important. On a mid-blue garment with the choice between a pale blue and a mid-grey thread, the latter would give a better result even though the hue differs.

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'.[12]

One method of simplifying colour is to restrict value contrast.



Note: Middle value grey is constant in both examples - the appearance of the grey doors is affected by background colour

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. (see pp 25-6)

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

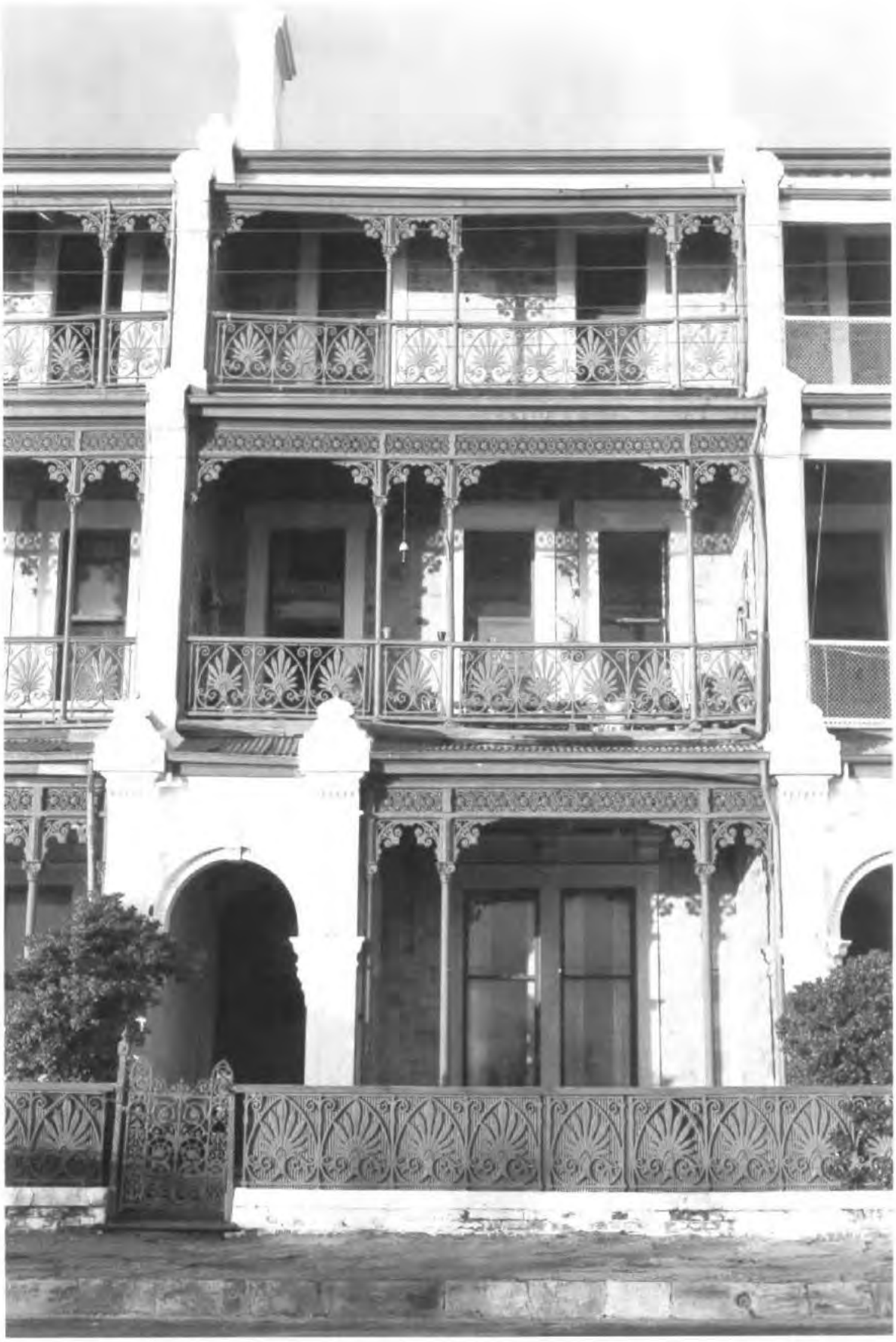
Holtzschue writes that it was common for colours to be associated with values like chastity, honesty and social acceptability well into the twentieth century, and quotes Goethe as saying: 'People of refinement have a disinclination to colours'.[9]

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.

McGowans Butcher Shop, Unley (c1900)
Source: Mortlock Library SA (B 16508)

Residence Julius Sawllick
Muller Street, Norwood (c1880)
Source: Mortlock Library (B 17450)



Esplanade, Grange

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 approoches 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. [16]

Terminology

There are many terms used to describe the various aspects of colour; for example, as already noted, 'saturation' 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. 'Black absorbs all wavelengths of light so shades are reduced hue experiences. Black mutes the hue, dulling as well as darkening it.'[17]

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 discernable 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. Holtzschue 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. Colors aren't more or less brown, but browns may be more or less red, green, orange, and so forth.[4]

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 with yellow and then looks quickly away to a white surface, the afterimage can be seen as a red square with a violet edge – the visually produced (not real) complementary colors to green and to yellow.[5]

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 painted 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.***[6] *(Emphasis added)*

Reference notes:

1. *Linda Holtzschue, Understanding Color, Van Nostrand Reinold, New York, 1995, p. 10.*
2. *(The viewer) An example is that of a seaman who regarded light oqua as a warm colour because his association with that colaur was shallow ond therefore relatively warm seowoter.*
3. *Holtzschue, op. cit., p. 52.*
4. *Michael Freemon, The 35MM Handboak, New Burlington Books, London, 1990, p. 63.*
5. *'Neutralising' of colaurs refers to a reduction in the intensity (or soturation, ar chroma) of a colour. See p. 24.*
6. *'Achromatic' means without colour; that is, the sample has no discernable hue.*
7. *Holtzschue, op. cit., p. 59.*
8. *See Ian Evans et al., Colour Schemes for Old Australian Hauses, Flannel Flower Press, Sydney, 1986.*
9. *Juliet Albany, 'Environmental Colour' Spectrum 1995, p. 5*
10. *Patricia Lambert et ol., 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 mare convex (just as it would on a close abject 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'.*
11. *The Builder, incorporating The Town Planning and Local Government Journal, 1925 p. 16.*
12. *John Ruskin, The Seven Lamps Of Architecture, J.M. Dent, London, 1932, p. 141.*
13. *Holtzschue, op. cit., p. 93.*
14. *(Intensity) Further old exomples of consideration of 'intensity' of colour in Appendices.*
15. *Reducing intensity – 'shadow'. See p.24 for reducing intensity by mixing with block, white or the complementary colour.*
16. *Building World, Saturday, 15 Jan. 1910.*
17. *Holtzschue, op. cit., p. 68.*
18. *ibid., p. 60.*
19. *Harald Mante, Color Design in Photography, Focal Press, London, 1972, p. 52.*
20. *Alfred Geeson, The Practical Painter and Decorator, vol. 2, Virtue, Londan, 1948, p. 123.*

4 COLOUR SCHEME SELECTION

Colour scheme selection is a criticol part of the tosk of repainting on 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, os well as some understanding of the broad principles of colour theary. (Refer relevant sections.)

A colour scheme is very opparent 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 on individual building and to select an appropriate approach helps to ensure a successful solution.

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

Building form needs to be evaluoted. It may be considered desirable, for example, to emphasise horizontal form with certain colour, or to demonstrate restroint 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 allowonces 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 roaf may need to remain unchanged. This would necessitate thot colour being occommodated into the scheme, even if temporarily.

The *approach*

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

- ottempting on ***accurate reproductian*** of either the original colours, or colours of a significant stoge in the history of the building.

- ***a canjectural appraach***, being an ***approximatian*** of colours used on a particular style of building at a certain time; that is, although not necessorily the actual colours used on the building, they ore authentic for the style and time.

- ***a cansidered cantemparary*** solution using the wider ronge of colours in a considered way, taking account of the body of the building, its style, the context, etc. This 'perpetuol' opproach is well founded in colour theary.

- o contemporory solution which needs to address certain limitations such as commercial restraints - for example, hoving to accommodate corporate colours into the colour scheme.

Commercially available colour cards are designed to help moke on informed choice. The cords, together with paint scrapes, should help in identifying o colour scheme that may be a reasonable interpretation of the originol scheme, or, similorly, assist where other solutions are intended.

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

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.[1] 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.

Occasionally o 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 aut the colour.

It should be kept in mind that, particularly on the exteriors or in wall areas more expased 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 af colours can be significantly changed. [2]

'Fugitive' colours, or colours which change in appear-once, 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.[3]

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 investigotion (where a 2mm square piece of point is cut through and removed by pressing firmly and pulling off with the tape), they will sheer because af their low cahesive strength. The texture of these undercoats is noticeably different from the finishing coat.

There are now sophisticated analyses that allaw the original colours af materials, such as textiles and paint/paintings, to be established with reasonable accuracy. Unfartunately these are expensive and usually not available on site. Guesswork may therefore be required to identify the paint colour before fading occurred. It moy then be matched with an existing available calaur.

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.[4] 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 ore those possible from the pigments which were more readily availoble 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.[5]

With black and white (Lampblack and White Lead) being other such exomples, it is understandable how the familior 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 dorker 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 vory 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 inoppropriate, could be modified, for example, by reducing the quontities of red. Retaining the original red colour as an accent while introducing o more neutral colour to give overall balance, could be a solution.

Accurotely reproducing any original paint colour, such as a particular green for example, and carefully using thot colour – even in o combination different from the originol one – will give a more satisfactory result than resorting to o 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 moterial colours and the colours chosen should relate to colours in the post, but otherwise there is scope for a good deal of flexibility.[6]

A considered contemporary scheme—the 'perpetual' or timeless alternative

The approoch taken in developing o 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 thon an original one. Nevertheless historical evidence encountered in the process of repainting should be documented ond preserved.

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

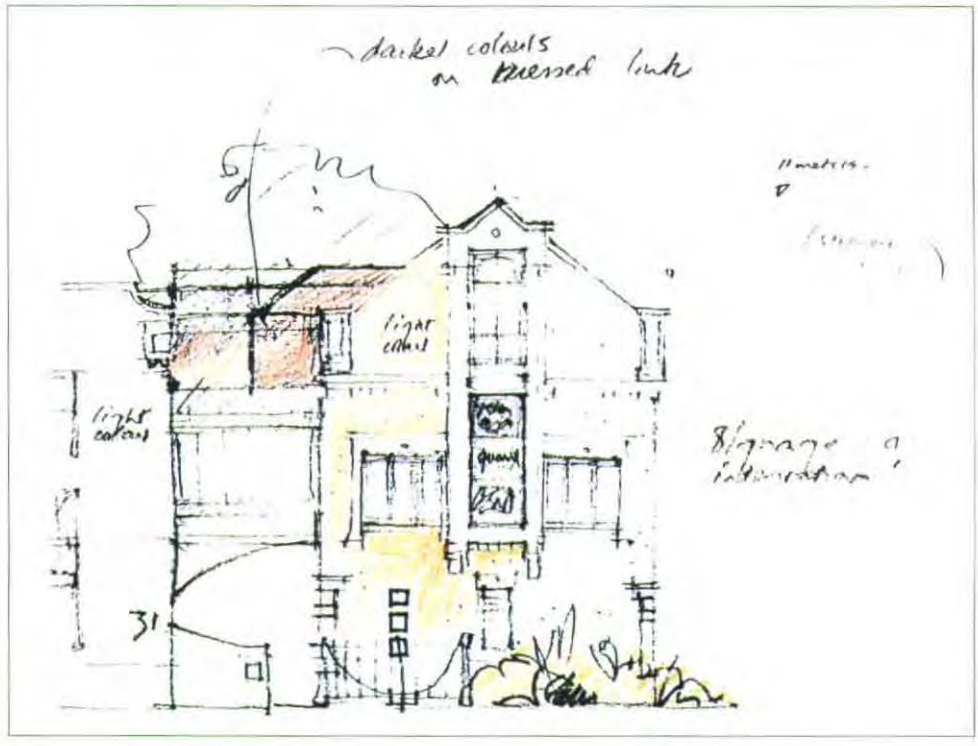
Responding to the body of a building

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 significont materials which will be influential in the final result.

Where the material being considered is made up of a number of colours, os 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 os air vents, doorknockers, chimneys etc., as well as any imposing factors in the immediate environment.

Where the form is complex, having elaborate detoils, or many different-shoped 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 feotures.



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.

Where additianal calaurs on o building are necessary, far example where extra building elements need defining ar where the use af ane calaur aver many elements wauld appear clumsy, a neutral calaur allaws camplexity withaut a riat af different hues.

Decoration

With greater awareness af earlier decarative styles there hos, for the last twenty years, been mare interest in applying such decaration ta buildings. There has been a great deal af enthusiasm and, as a result, there are excellent examples af wark that is well executed. Sametimes, hawever, the approach has been averzealaus. Far instance, elabarately 'picked-aut' paintwark is naw faund in inappropriate places, the wark abviausly having been carried aut withaut adequate investigatian af either the underlying paint-wark ar the histary af the building.

This is in cantrast ta anather less-than-ideal approach that has been ta disregard any detail by painting buildings entirely in white.

Fartunately, point is transitory and the applicatian af paint calaurs has always been influenced by fashian. These facts allaw buildings a vitality thot would not be passible if there were ta be rigid adherence ta 'rules'. Terence Lane and Jessie Serle in their baak 'Australians at Hame' quate fram an ald publicatian when making a paint about appraprioteness in the matter af decorotion:

How much better it wauld be if, instead af things which praperly belang anly ta grand receptian rooms and stately galleries, we wauld contrive a style af decaratian which shauld be in keeping with the houses in which we live and with aur manner af life.[8]

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.*
2. *Linda Holtzschue, Understanding Color, Von Nostrand Reinhold, New York, 1995, p. 105.*
3. *Colour systems. Refer p. 68*
4. *Publications on period point colours · see Further Reading.*
5. *Gordon Bock, Old-House Journal U.S.A., 'Choosing Exterior Paint', 1996, p. 54.*
6. *ibid., p. 53.*
7. *ibid., p. 54.*
8. *W. Fulton, Taste in House Decoration, Australian Decorator and Painter, 1906, p. 6.*

PAINTING AND DECORATING

The marked improvement in trade shown by the Board of Trade Returns will doubtless have an appreciable effect upon the painting and decorating trades when the coming political struggle 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 repainting as a necessary protection of their property, in other words, as an expenditure as much required as is insurance; while others are apt to regard it more or less as a luxury, and hence postpone the work as long as possible.

Naturally, the painting trade is not one in which drastic changes are suddenly made, yet great progress is recorded in the manufacture of pigments during recent years. The present tendency is distinctly towards the increased employment of non-poisonous paints, particularly those made from oxide of zinc. A great deal of attention has been paid to this subject by the press and sanitarians lately, and many Government officials, including such prominent men as Sir Henry Tanner, are heartily in favour of such paints to the exclusion of those of a poisonous character. We have got beyond the point of supposing, 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 popularise non-poisonous paints is this: There are, as a matter of fact, only two manufacturers of paints and colours in this country who corrode their own white-lead; all the others have to purchase their lead from the corroders, it being received by them in the form of white powder which they grind with oil. The Board of Trade restrictions, however, even in this simple operation, are quite severe, and in some cases a special plant is insisted upon. In these circumstances, several paint-manufacturing firms will not touch white-lead at all, excepting when, for the convenience of their customers, they buy it ready ground and put up in sealed kegs.

Perhaps no series of pigments has been improved to a greater extent than the so-called "imitation vermilions," although in this connection the word "imitation" is peculiarly unfortunate, because the word implies something inferior, whereas in fact the new reds are much superior. What is meant is a bright red intended to take the place of quicksilver vermilion. Efforts have been made for years past to produce such a red which should be as permanent when exposed to the light as vermilion, and cost less; and several years ago success was met with, and some very beautiful reds were produced which were undoubtedly at least equal, if not superior, to vermilion from the point of view of being permanent, while the cost was very considerably less. Unfortunately, however, these colours possessed the property of "bleeding," that is, if any colour such as white was painted over them, after a period the red would quickly eat its way through the coat and show in blood-like drops on the surface. This meant in effect that the colour could hardly be changed when once a wall was painted with red. Now this defect has been overcome, and these red colours can be purchased at a very moderate price, and warranted not to bleed, at the same time possessing the quality of being to all intents and purposes permanent.

In some quarters, white enamel is said to have had its day; but, as a matter of fact, it is more popular than ever, although flat enamels are used to a greater extent than before, particularly in conjunction with the glossy. Panelled work, finished with glossy enamels on the stiles and rails and flat enamel on the sunken panels, makes a very handsome job, and a very durable one. The gloss of one surface is accentuated by the mattness of the other, and vice versa. Those who imagine that white enamel, which is unquestionably the most popular of paints, is doomed to become obsolete in a few years' time because of the inevitable change of fashion in decoration, should remember that if some fickle lady gets tired of the whiteness of her drawing-room or boudoir, she has only to instruct her painter to give the work a glaze of some light or brilliant green, yellow, red, blue, or other colour to produce an exceedingly pretty and delicate green, light transparent amber, 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 firm and durable base of white enamel.

An inspection of the wallpaper books for the coming year shows that there is a large increase in the number of fabric designs, that is, those which are designed to represent various textile goods; but the chief point of interest is in the production of "cut-out" designs. These are intended to be used for the production of various effects, such as panelled work, special borders and corners, stiles and fillings being supplied, the whole being cut out from a piece of paper as may be required. In using them it is necessary that the decorator does considerably more than stick the paper on the wall; he must carefully plan out his panels to suit the apartment he is decorating, and this feature alone renders the new departure an encouraging one. "Crown" friezes have been known for some years past; they consist of a frieze printed on, the filling beneath usually forming part of the design. As, however, only three lengths can be printed on one piece of paper, they prove to be somewhat expensive. In the coming year's books there are a number of friezes which are intended to be scalloped or cut out to the design at the bottom, and so give the effect of a "crown" frieze.

On January 1 the manufacturers of Lincrusta-Walton are putting on the market an extremely useful new material, named Metaxyn, which has exactly the appearance of the richest silk or satin. It is made in many beautiful shades and admirable designs, and possesses the great advantage of being washable.

ARTHUR S. JENNINGS.

CONSTRUCTIONAL ENGINEERING

During the past twelve months the science 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 many new forms of detail and construction evolved, and also undoubtedly a great advance and increased employment of certain existing materials and methods. Steel skeleton framed buildings have become very general in large works, and this so in spite of the fact that the London Building Acts did not offer any inducement to construction of this nature, insisting, as they did, on thick walls in high structures, regardless of the fact that such walls were frequently carried directly by steelwork at each floor level, and consequently had no structural value, but rather added to the dead-load to be carried by the steel framing. 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 one day, 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 16, 1909, and is of the utmost importance to all engaged in the design of buildings in London. It allows of the construction of buildings having thin walls (that is, 13½ in. and 9 in. thick only), which will not only mean a great saving in brickwork, but also a saving in steel on account 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 specified and calculations must be deposited with the district surveyor, so that approximation will not avail, particularly in the case of stanchions eccentrically loaded and similar problems. While the regulations for reinforced concrete are not, at the present, at all definite, the council have secured the power to frame such regulations as they deem necessary, and there are no longer the hard and fast rules of the old type of construction. Fire-resisting construction is undoubtedly another important consideration, and definite regulations are given as to the casing and protection of all structural iron and steelwork under the new Act. Floors and staircases will also be of resisting materials with supports of a similar nature, so that great attention will be paid to this branch of construction. Foundations will require to be carefully designed in order that the safe loads specified under the Act are not exceeded, and this will mean an extended use of grillage foundations; probably the Compressol system of foundations will make an appearance in actual work, as with this method a soft soil could be economically built upon. Timber as a constructional material in large buildings is rapidly becoming displaced, and its chief use will be in domestic work and in finishings of more important buildings. Doubtless many new so-called improvements and variations will be produced in all kinds of construction, and particularly in reinforced concrete work; but the general type of the future will undoubtedly be one that is fire-resisting and capable of being speedily erected; whilst in domestic work the greatest developments will be more in the general planning and arrangements of buildings to give the maximum amount of open space than in the principles of construction.

ALFRED LAKEMAN.

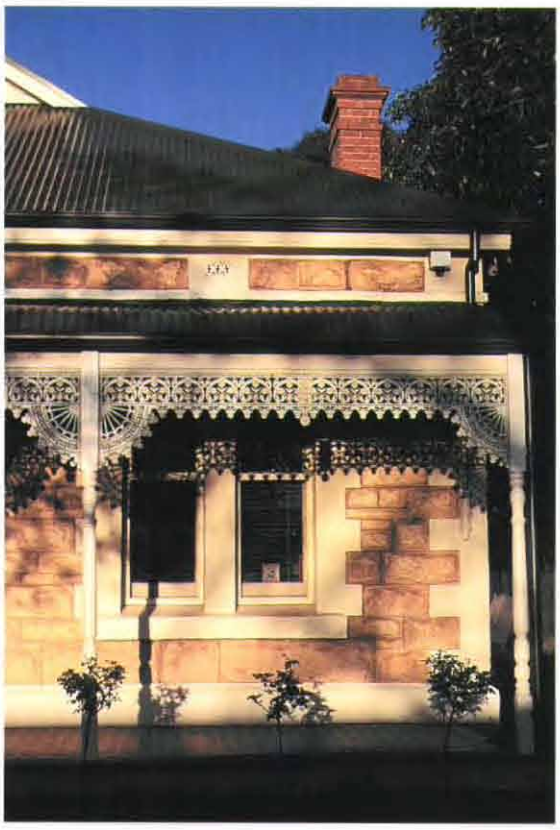
HEATING AND VENTILATION

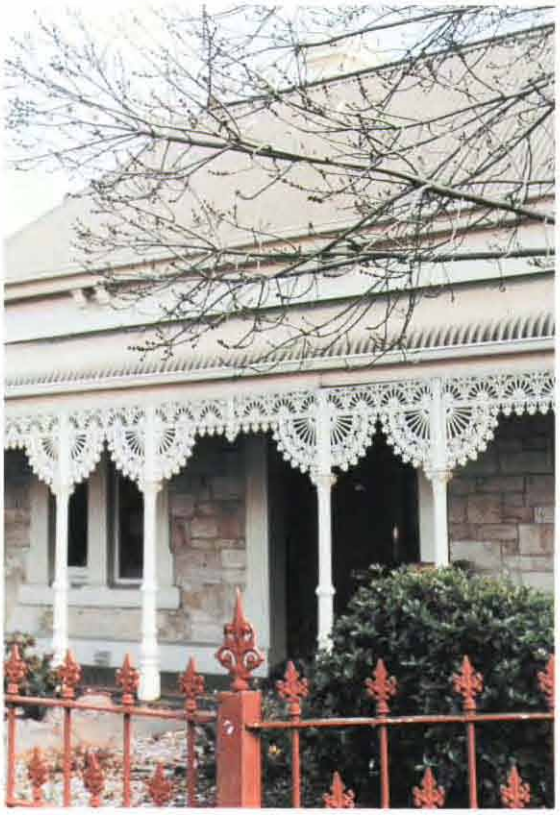
The prospects of the heating and ventilating engineer for 1910 may be considered satisfactory, chiefly because the demand for this work, particularly heating, has been on the increase for some years, and this increase will undoubtedly continue; while appliances, methods, and systems, and also knowledge on the part of the engineer and experience on the part of the public, have become more perfect. There is little likelihood of heating and ventilation showing any backward movement except that occasionally due to depression in trade.

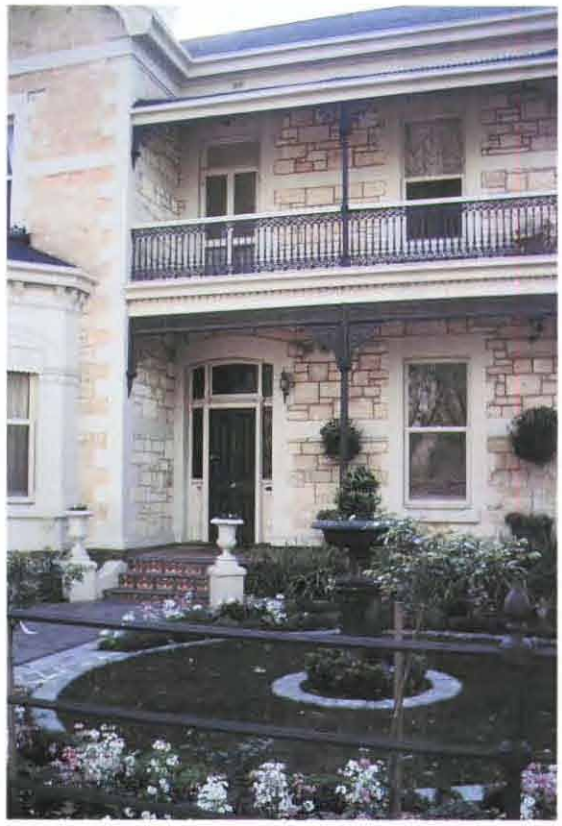
But a few years ago hot-water heating in residences was nearly unknown, and there existed a peculiar prejudice against it, whereas now almost every householder would welcome it if the cost of installation was not so high. It is such an economical source of heat, so greatly reduces labour and dirt, allows of open doors and windows in winter, and is healthful. There are one or two good heaters on the market to fix at the back of grate fires to heat radiators in one or two other rooms on the same level or on the floor above. They are successful, and, to give the special reason for mentioning them here, they act as the "thin edge of the wedge" in making the heating of residences by hot water more recognised and universal. There is an immense market here, and the prospective user is ready to welcome the radiator, but the barrier of the cost of the customary complete installation is a difficult one to get over. The heater just mentioned is a convenient half-way measure, an incentive, and should never be a disappointment.

Business buildings, institutions, factories, and the like are now almost invariably heated by hot water or steam, and every such place that is erected carries an order for the heating engineer. There can be little doubt that hot water always proves the most economical source of heat as regards fuel consumption, owing largely to the consumption being in regular ratio with the weather; but it is equally certain that it stands highest in cost of installation. There is also a limit to the adoption of the ordinary hot-water system, this being found in the enormous public buildings that are being and have been erected. For these there are now the atmospheric steam-heating system

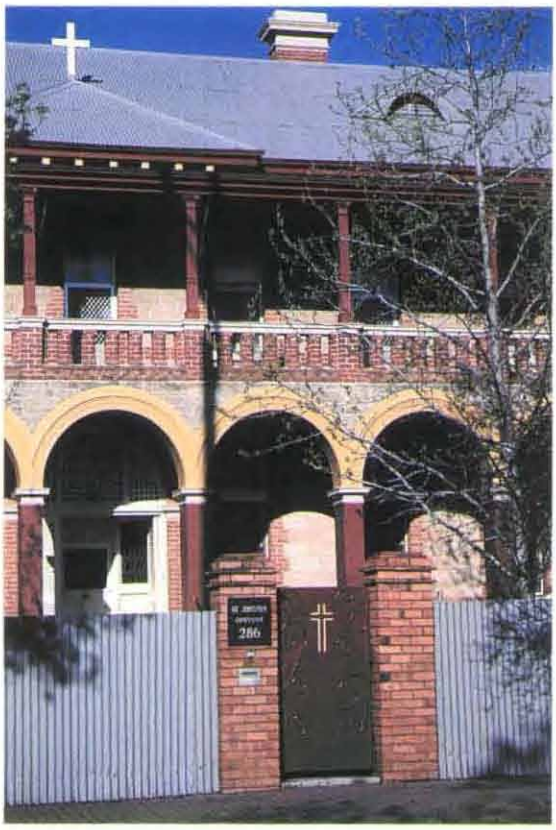
Examples of colour schemes



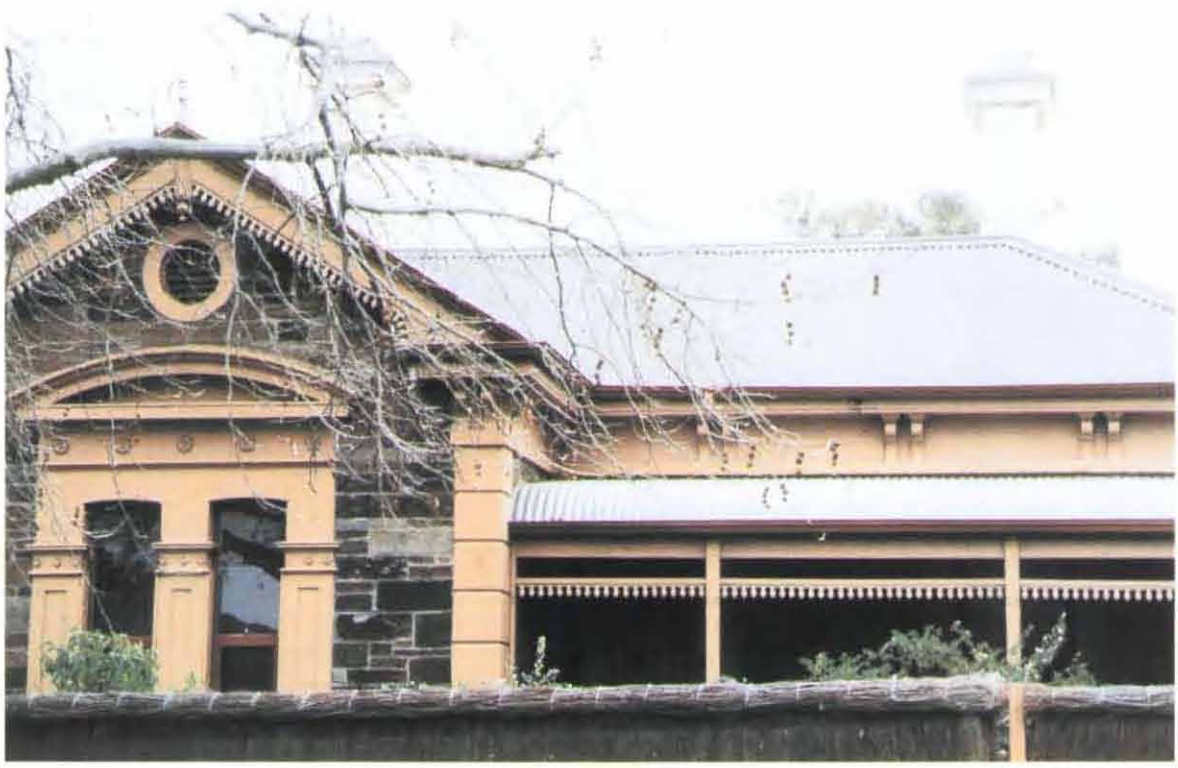


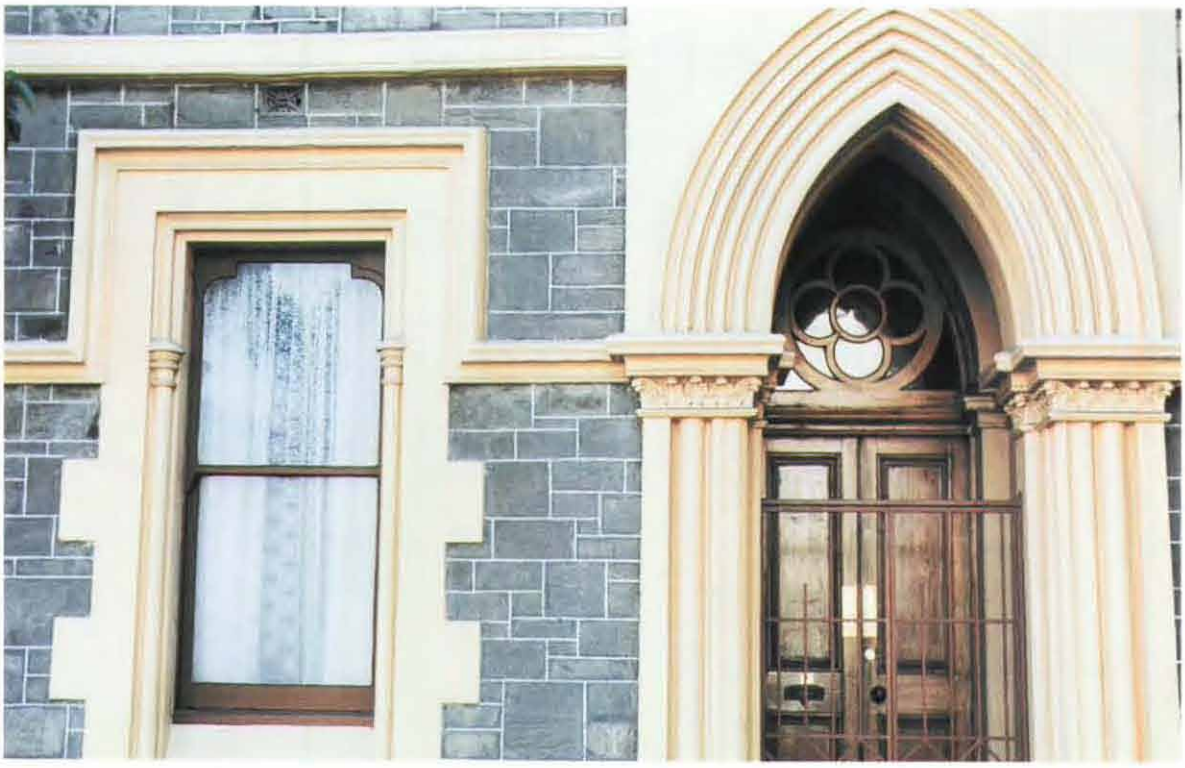


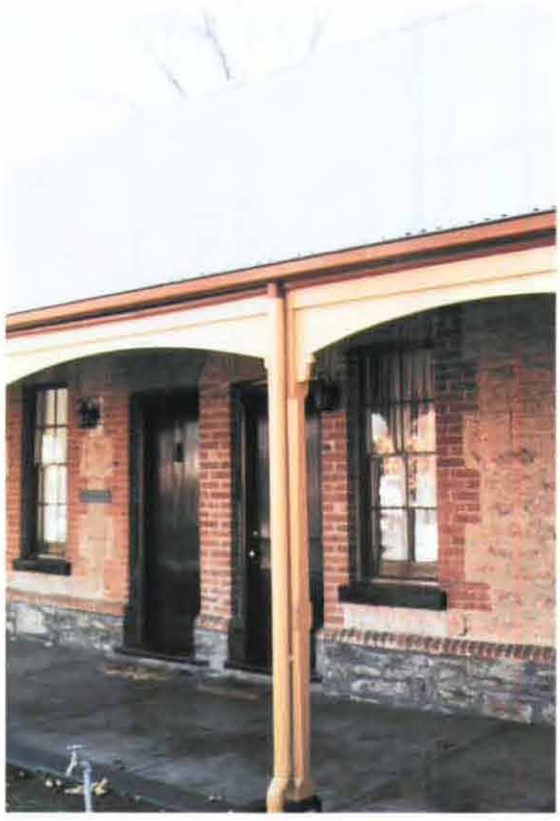
Variation and individual expression are possible with a limited palette of colours. Sandstone building bodies, pale, rendered quoins and grey roofs are common factors in these schemes. Note how the light coloured lacework on one building 'advances' whilst the dark lacework on another 'recedes'.

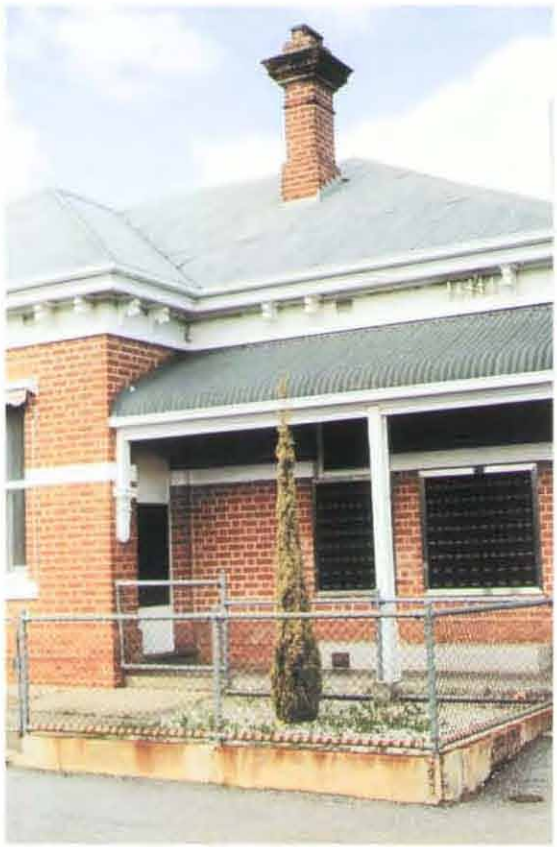


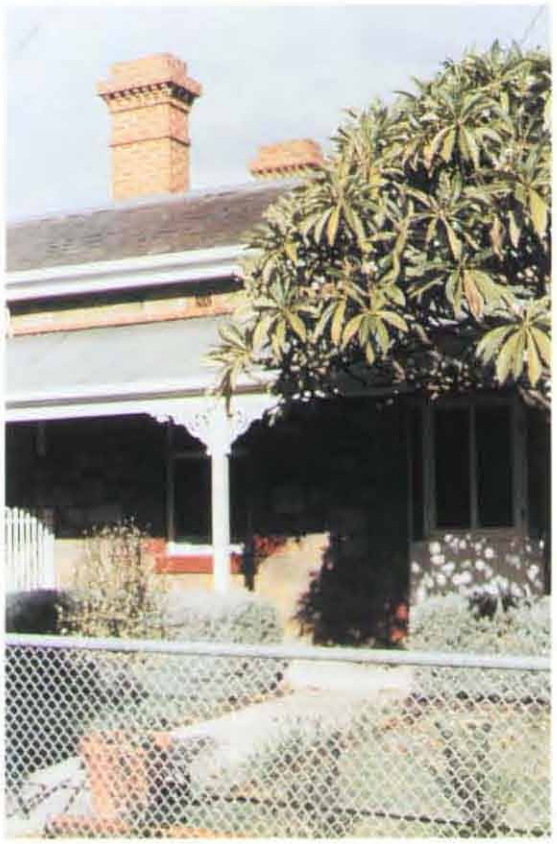
Grey roofs and fencing, the crisp white of the pointing and sundry white items counter any inclination to dullness in these schemes of bluestone combined with ochre and red-brown hues.
See this page and following page.







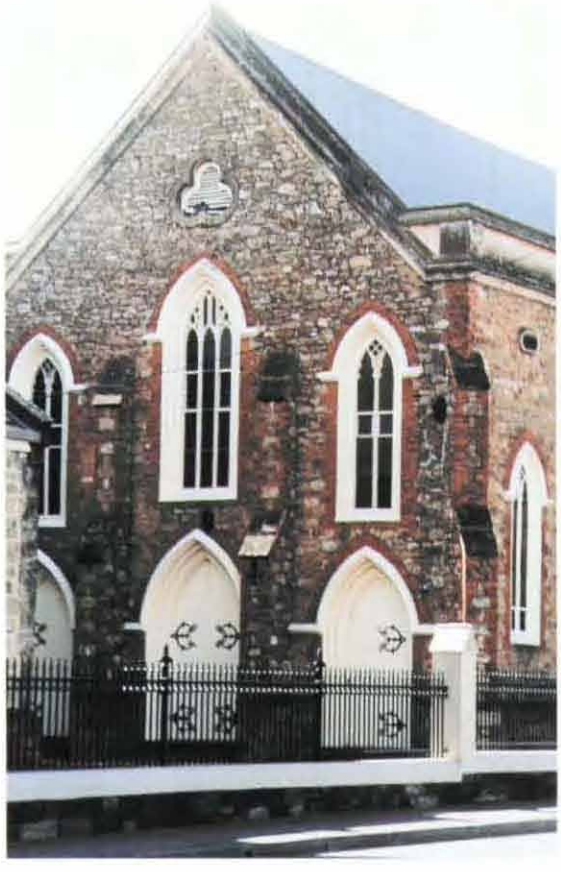


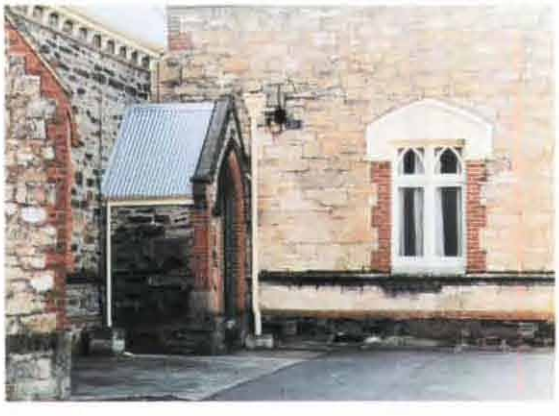


Straightforward use of materials and simple effective use of white

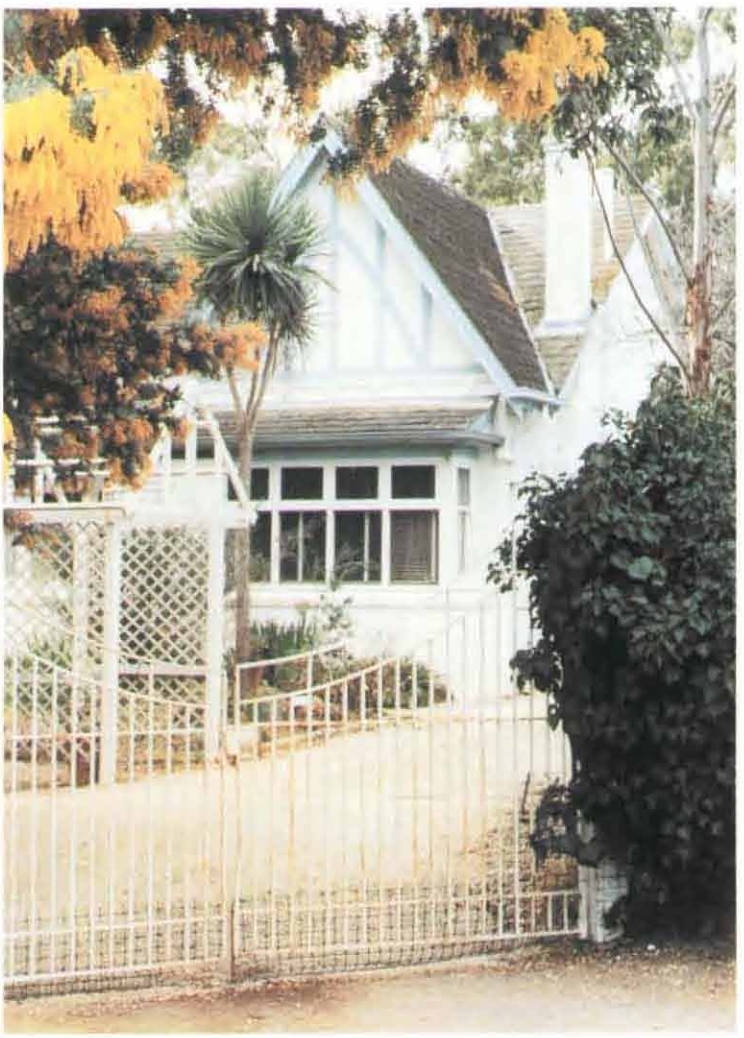
An example of a well-balanced scheme: the neutral paint colours complement the building materials and allow expression of the building detail. A darker gutter successfully defines the edge of the grey roof and adds interest with the value contrast. Note: More contrast on the gable, either in hue or value, 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.



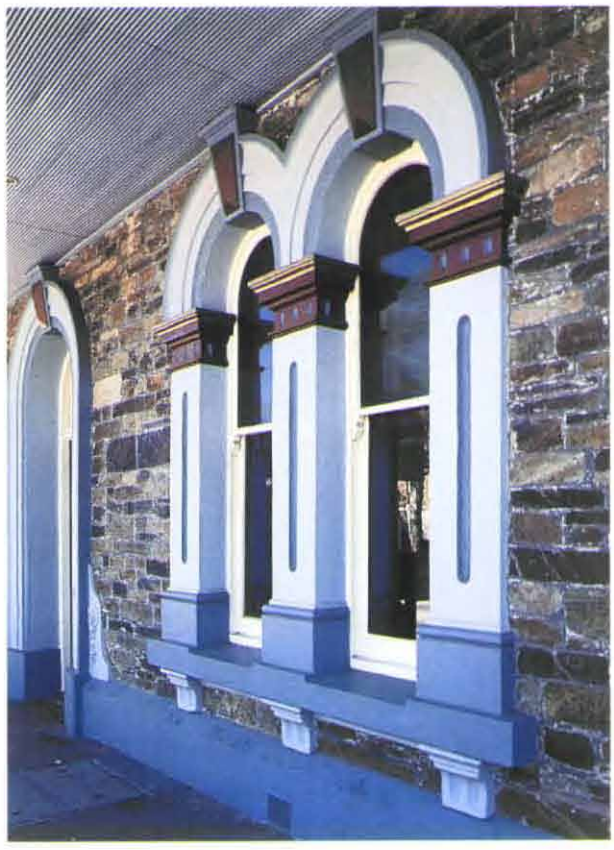


The similar, warm hues of the stone and paint colours allow subtle definition to the gable detail while not 'breaking up' the building form. The vertical nature of the chimney wall, for example, is reinforced by keeping the tonal (value) contrasts slight.



The gable detail is readily noticeable because of the introduced hue (blue), even though the value contrasts are not major.

The strong tonal (value) contrast of dark green and off-white results in a dominant lineal 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. Unpainted 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.

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 dentiles. Restricting the deep red trim to a fine element avoids adding unnecessary warmth to the scheme.

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.

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.

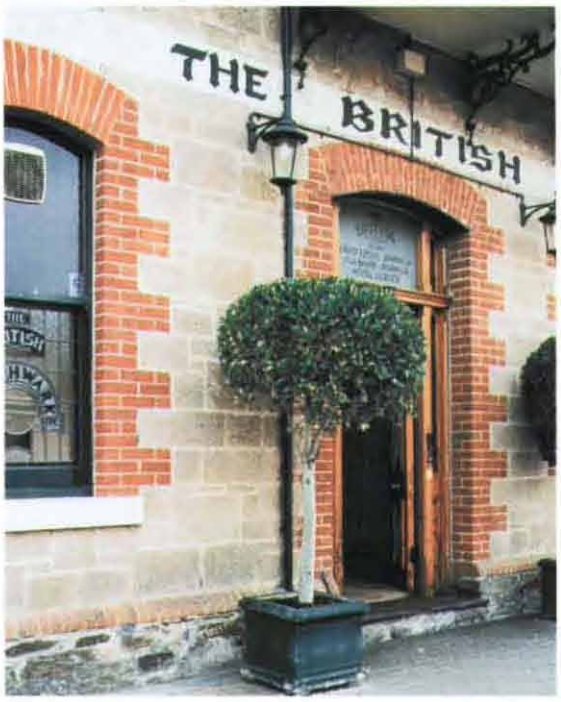
The white door relieves heaviness in a dark, warm colour scheme.

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.

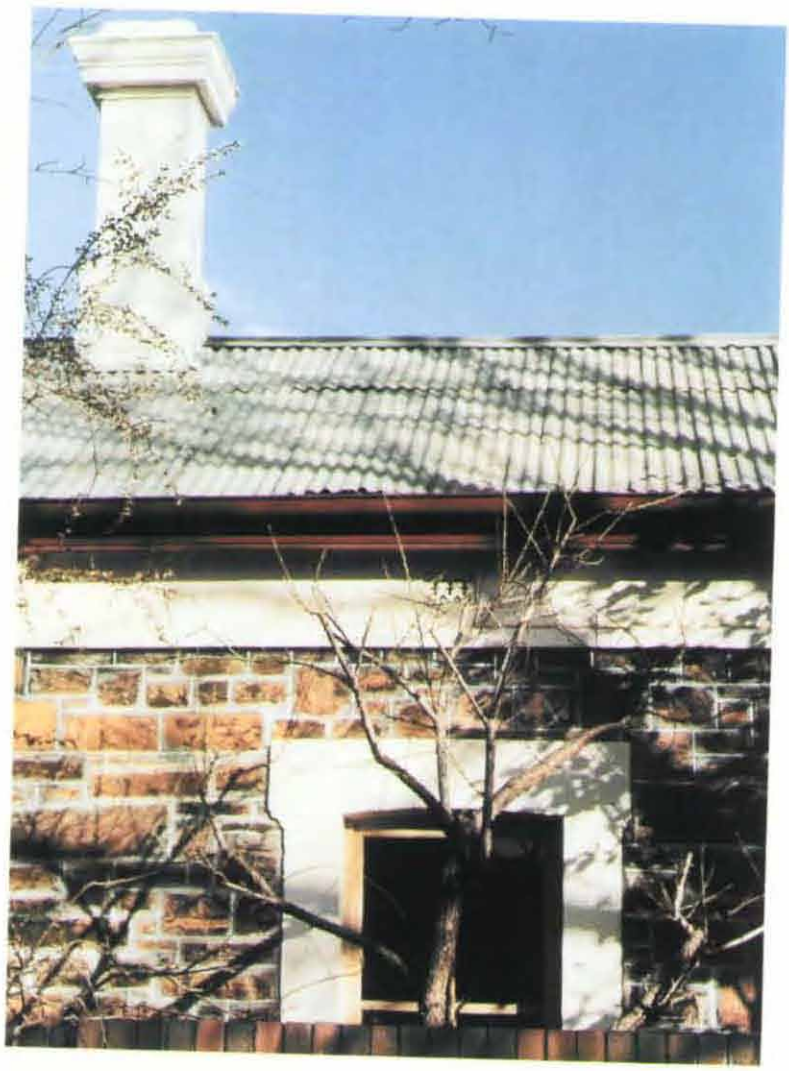
A standard combination of 'heritage' colours with a strong Red, Green and Cream hue contrast. When the cream is more yellow and intense in colour, the overall effect is 'amplified'



Colour is confined to finer building elements and so the overall appearance is more controlled or 'refined'.

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. Quoins 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 eorly twentieth century paints were mostly individually prepared. The master painter[1] produced paints by hand 'fram samewhat limited materials, certainly in a rather crude and unscientific manner and aften with materiols that are na langer available taday'.[2]

Originally the pigments were sald 'dry' and mixed an site. Later they were purchosed os colaurs in ail but even so, os in the case af white lead, the breaking dawn af the ingredients inta a paint suitable far application, was carried aut by the master painter.[3]

Early methods

Traditianal methads were time cansuming, and painters were faced with a difficult task because af the almast camplete lack af standord farmulae, calaur terminalogy and knawledge af chemistry. Nevertheless these painters were highly skilful. Seven years were spent learning the trade, and guilds exercised strict cantral aver the training of apprentices.

The painting af mast South Australian buildings follawed this practice until araund 1930.

Traditianal paints and coatings

Traditional paints and coatings can be divided inta three braad categaries:

Turpentine 'thinnable', such as glass paints and varnishes which were mastly used an wood ar metal.

Spirit 'thinnable', such as spirit varnishes (far example, Shellac) and French palish that is thinnable with methylated spirits.

Water 'thinnable', such as whiting, limewashes and pigment washes, which are frequently used far external, rendered areas ar masanry walls, and distempers (including Kalsomine) which are mastly used far interiors.

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

In general, ail paint was used far exteriar and interior woodwork and iranwark, distemper ar wallpaper far ceilings and walls, and varnish for the pratectian af paintwark ar stained floors.

Traditianal ail paints

Traditianal ail paints, which were turpentine thinnoble, relied an the purity af the ails and pigments used. The quality af the ingredients af paint has always been an impartant factar in obtaining a goad and durable finish. Oil paints made af linseed ail provided an elastic and hydraphabic coating well suited to timber.

Because the ail affarded goad water repellency, these paints alsa pravided a degree of corrosian pratectian ta ferraus products including cast and wraught iron.

'Far generotians serviceable paint was made simply by mixing together pure white lead, pure linseed ail, turpentine and a drier far white paint'.[4] However, white paint produced this way and applied ta surfaces which were expased ta extreme sunlight was inclined ta chalk aff. When zinc axide was added to the paint the result was harder wearing praperties.

Traditianal primers

Traditianally red lead was cansidered the best primer an both timber and steel. Accarding ta Gehrig,[5] typical farmulas wauld have been:

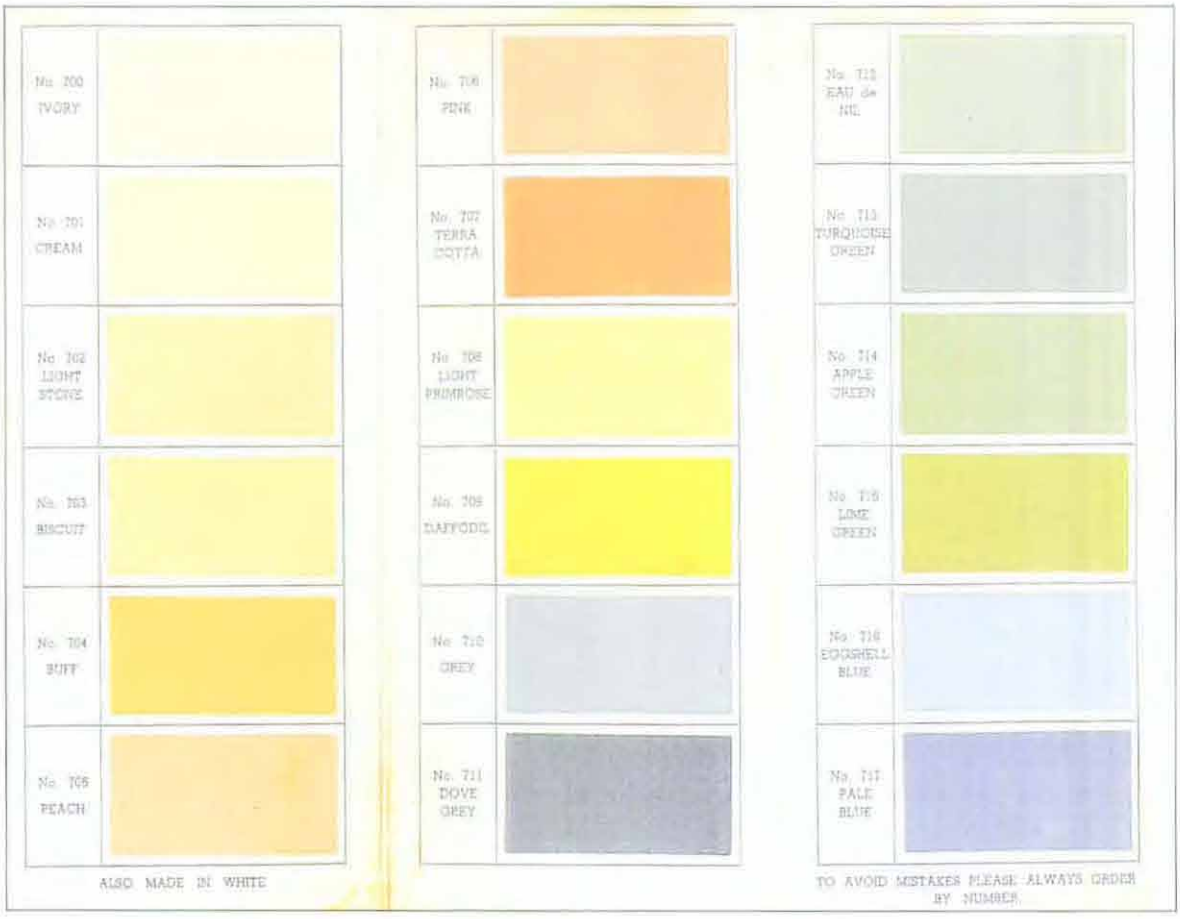
Priming for hardwood

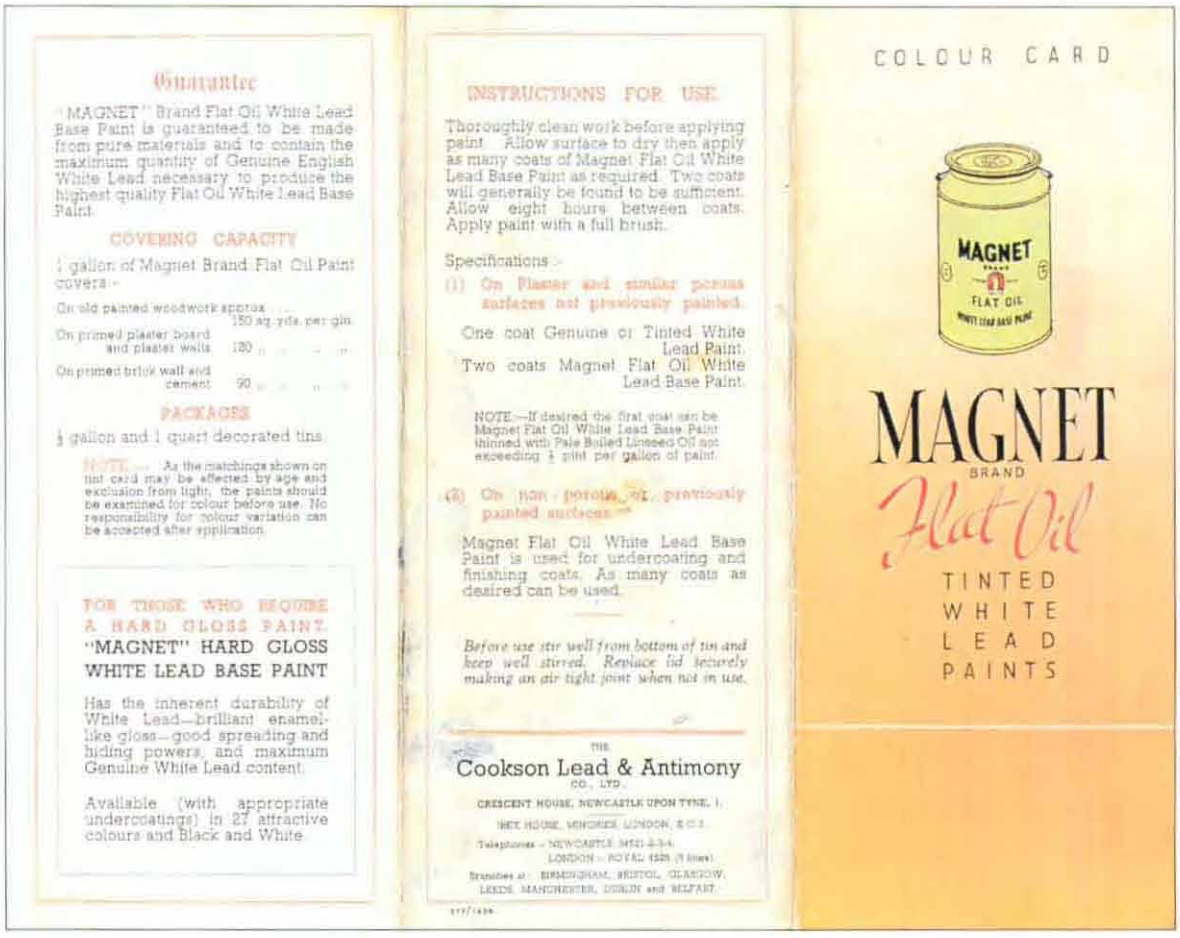
White lead	20lbs
Red lead	6 1/2 lbs
Raw linseed ail	60%}
Wood turpentine	37%} 5lbs
Terebine	3%}

Priming for metal

Red lead	20lbs
Raw linseed ail	50%}
Wood turpentine	46%} 5lbs
Terebine	3%}

The colour of these priming caats was a bright pink, the calaur being incidental to the amount of red lead used.





Courtesy: Alan Feder, Solver Paints

Painting of Older Buildings

BORTHWICKS

AB

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.

AB

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.[6]

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 raw 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 raw linseed, although films would still yellow in the dark and in sheltered or indoor locations. Yellowing in ultraviolet light-exposed locations was, however, minimal.[7]

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

Toxic ingredients

Toxic ingredients, usually small quantities of lead, arsenic and cadmium, were commonly used in paint manufacture.

Copper arsenic green pigments were used because of their preservative properties until the 1870s, when chrome oxide green was substituted. Whilst copper arsenic green pigments are extremely toxic and no longer in paint, they are still used to preserve timber (treated pine).

Its (lead) absence was often blamed by old-time professionals for paint failures but authorities agree that virtually the only loss attributable to the removal of lead is some covering power in a few of the deep colours; the durability and opacity that lead used to give paint is now provided by synthetic resins and by other pigments.[8]

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.[9]

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.[10]

Varnish dries in an interesting way.

The volatile thinners evaporate; the drying oils oxydize (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.[11]

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 Japan, it is usually made from natural asphaltums with some drying oil and possibly some resin.

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 Pb_3O_4, and it may be regarded as 1 part of lead peroxide (PbO_2) and 2 parts lead monoxide (PbO). As ordinarily obtained on the market it contains from about 70 to 99 per cent. (usually over 85 per cent.) of Pb_3O_4, 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 stiffly, 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 Pb_3O_4 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, flows out better, and has less tendency to sag and run. Other experts claim that the cause of hardening in the container of ordinary red lead is coarseness and not the presence of lead monoxide. The same authority states that some red leads containing only 85 per cent. Pb_3O_4 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. Pb_3O_4.

"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 read 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 red lead (Pb_3O_4), the remainder to be practically pure lead monoxide (PbO). *Impurities:* To obtain not more than 0.1 per cent of metallic lead, not more than 0.1 per cent. of alkali figured as Na_2O, and not more than 0.5 per cent. of total impurities, which include all substances other than lead oxides. *Fineness:* 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 gills; drier, 2 gills; and applied to a smooth vertical iron surface, it shall dry hard and elastic without running, streaking, or sagging.

Brown paints may vary from colours which are nearly yellow to those which are of 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.

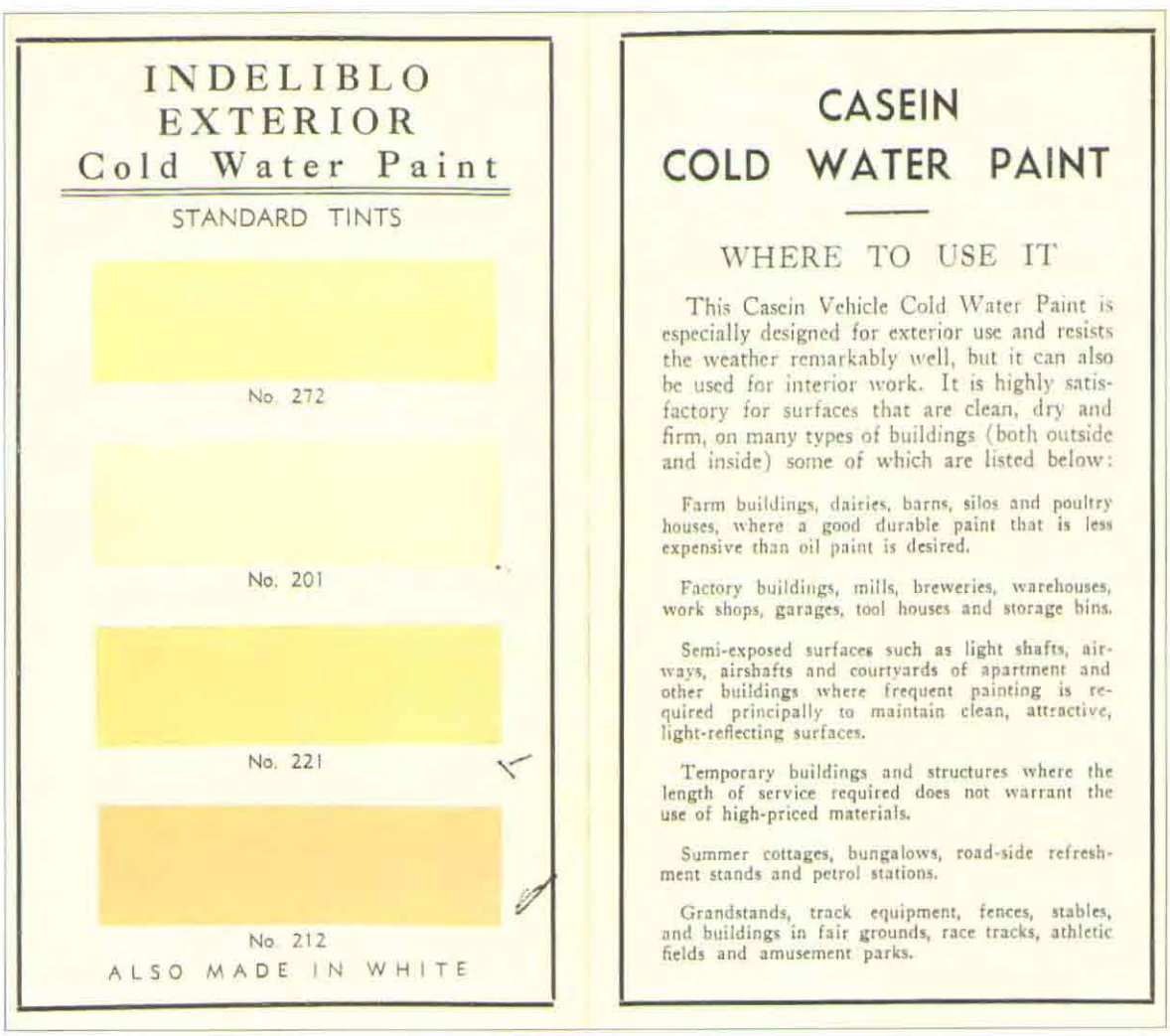
Water-based paints

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 unslaked 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.[2]



Courtesy: Alan Feder, Solver Paints

Cold-water paints or calcimines

Cold-water paints or calcimines had as their bosis 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.[13]

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.[14]

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 af being subject ta 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 Walpamur 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, phoenolic 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.)[15]

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 gloss 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 turps and as a finish coat when mixed with raw and boiled oil. It did have the disability 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.[16]

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

Lead-linseed 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 diaxide

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 Australia' 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 Paint Factory remarks he has turned out bulk samples of ochre and paints equal to any he has used in the colony. The ochre when properly washed is a splendid article, that from the mine is the best, it being equal to sienna, the imported value of which (when ground in oil) is about seventy pound 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 reds. The darker ochre from the upper part of the mine makes good umbers.[17]

Naples yellow was a particularly popular colour. Of the various recipes, Gehrig 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'.[18] 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'.[19]

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 Sienna, 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'.[20]

Cornine 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.[21]

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.

Terre 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 become quite popular: when mixed with copal varnish and linseed oil they were extensively used as trim colours.[22]

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.[23]

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'.[24]

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 1lb.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 Turkey umber and Turkey red rank next to yellow ochre and lampblack for outside work, provided that they are ground in good oil. [25]

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 1 to use surplus quantities of the explosive nitro-cotton.

Courtesy: Alan Feder, Solver Paints

Courtesy: Alan Feder, Solver Paints

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.


ALL GOOD PAINTERS AGREE
that NU-ENAMEL Enamelised Paint
IS THE FIRST BASIC IMPROVEMENT IN HOUSE-PAINT IN OVER 400 YEARS
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 Enamelised 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 this shocking illustration on the left. NU-ENAMEL Enamelised Paint will not CHIP, CRACK, FADE or CRINKLE.
Enamelised 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 Enamelised Paint and, thereby, restore its original lustre and beauty. Washing costs much less than repainting–Save the difference!
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How long did your last exterior paint job retain its original appearance? The average life of NU-ENAMEL Enamelised 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.
LASTS MUCH LONGER
Why NU-ENAMEL Enamelised Paint leaped into world leadership
From the year 1521 when the Dutch introduced Lead-and-Oil, until NU-ENAMEL invented Enamelised 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 Enamelised 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—zinc oxide and titanium oxide—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 waterproof—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 Enamelised 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

Courtesy: Alan Feder, Solver Paints

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 McCorquodale.[28] The process uses 'nitro-cellulose lacquers tinted with exactly the proportions of the actual paint' and is still used by most paint companies.[29]

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.[30]

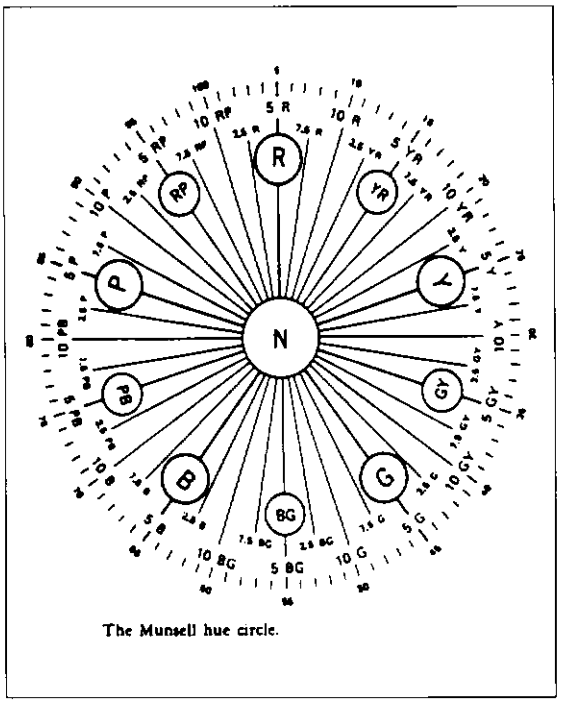
Standards for paint colours

Just as the recording and research of music is extremely difficult without a system of notation, so is the case with colour.[31]

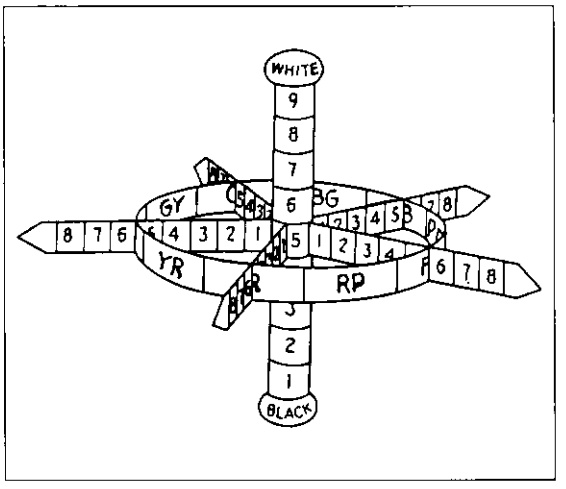
Traditionally names have been used to identify colours, and people still like to refer to them in this way. The use of names for colours is, however, fraught with problems. 'Duck egg blue', for example, may or may not resemble an egg of a duck and is a difficult colour to imagine.

In response to confusion about paint names the British Standard for point 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.



The Munsell hue circle.



The Munsell system from two perspectives.

Colour systems

Munsell system

This system is based on the attributes of hue, value and intensity. Colours are arranged in a three-dimensional 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 notatian af hue, value, and chrama. Far instance, 'turquaise 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.[32]

N C S 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 bosed 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.[33]

C I E system (Calaurcurve 1988, USA)

*The COLORCURVE calaurs are arganised in what is knawn as CIELab*calaur space. CIELab has its raats in calaur measurement and the prablem af establishing a 'calaur difference farmula'. The CIELab farmula has been adapted as an internatianal standard and it is naw widely used.* [34]

It is highly technical and the data fram this system is able ta be sent between manufacturers, and even between cauntries, with calaurs being repraduced accurately as a result.

Decorative finishes

As well as painting in plain calaurs, ather farms af decaratian became papular in public buildings and better hames.[35] Thase finishes included glazing, graining, stippling, stencilling, and marbling (faux mabre). Further references are given at the end af this sectian and brief descriptians fallaw.

Jainery was 'frequently grained ar marbled in Australian hauses af the nineteenth century and may be seen in hauses as late as 1920s'.[36] The practice came about as the result af building awners aspiring ta mare affluent finishes.

Glazing

A transparent calaur ar cambinatian af calaurs is applied aver an apaque base caat. Glazing liquids were usually made fram good quality varnish, ail and turpentine. Different effects were abtained by blending the calaurs using rags, stipple, spange etc.

Nate: A glaze is a semi-transparent film af ail-based calaur, while a wash is a semi-transparent film af calaur diluted with water.

Innes writes af the subtle visual differences between the twa that 'ail-based calaur tends ta be richer, sleeker and mare transparent, while calaur in water is fresher, purer, still diaphanaus, but "brushier" looking'.[37]

Bath are used aver painted surfaces ta alter the calaurs beneath.

Graining

The imitating af the grain af variaus, usually expensive, timbers. Gaad tradesmen took particular pride in their expertise at this process. There are excellent arigінal examples still preserved and there is a resurgence af interest in the pracess. Practitianers af the craft are available.

Stippling

The decarative pracess af applying a secand calaur aver a previausly applied graund calaur in a braken manner by use af a spange ar raller.

Stencilling

Wark in which calaur and design are transferred thraugh paper ar metal patterns directly anta a surface. Stencil brushes, a little like shaving brushes, were used, as were small rallers. Stencilwark was aften used as a decarative feature at the dada line.

Marbling/Marbelising

The imitating af marble, cansists af 'laying an a good graund calaur and then tracing the pattern af marble in ather calaurs, using special taals and equipment'.[38] Veining was aften achieved by the use af feathers.

Tartaiseshelling, ebanising, bambaaing and even trampe-l'aeil ('to deceive the eye') are amang ather decarative finishes which may be encauntered.

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2. *Keith Gehrig, A Guide to Traditional Painting Techniques. Research Study no. 9, The Heritage Council of New South Wales, 1985, Intro., p. 1.*
3. *ibid., p. 2*
4. *Theo Audel, Painting and Decorating Working Methods, International Association of Master Painters and Decorators, New York, 2nd ed., 1945, p. 47.*
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6. *Keith Gehrig, Bill Stewart et al., Paint and Wallpaper, Time Life Books, Amsterdam, 1984, p. 52.*
7. *Clive H. Hare, Materials Technology – Anatomy of Paint,'Vegetable Oils', 1994.*
8. *Gehrig & Stewart, op. cit., p. 52.*
9. *Audel, op. cit., p. 72.*
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.*
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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.*
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6 CONTEMPORARY PAINT PRODUCTS

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 appropriote paint system chosen.

Paint

In broad terms paint is any liquid, or thin paste, applied to a surface for the purpose of protection and decorotion. It may be opaque whereby it conceols a surface well; it may be semi-transporent, allowing the surface to show through dimly; or it may be so transparent as to hide very little of the surface substrate.[1]

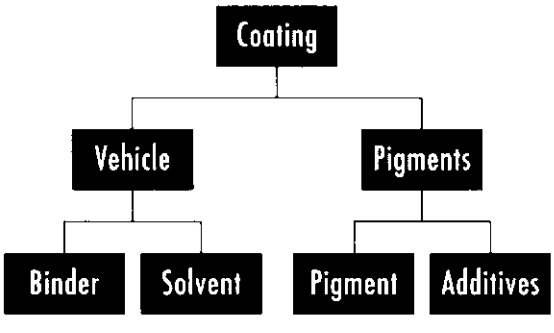
Paint is used to protect the building fabric surface from destruction by the natural elements: sun, rain, wind, cald and frost. Paint arrests wood decay by seoling up the pares and keeping out moisture. It pratects metal by preventing rust formation (corrosion by-product) ond it preserves other materials 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 compaments: 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 impartant 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 praperties af the coating as film thickness, cahesian and hardness, and the ability to form a thin tough film.

Resins were ariginally 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 praduced fram petraleum 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 ta impart specific praperties to the coating. One group known as extender pigments are used to cheaply increase the volume solids af the caating, and athers used are dryers,

ontisettling and antiskinning agents, wetting aut agents and biacides. Plasticisers are impartant additives that imprave and enhance the praperties of caatings.

Curing of coatings

There are a number af ways in which paints cure. Curing means that the binder farms a salid, cantinuaus film that pravides the desired protectian. The term 'drying' is aften used to mean curing rather than simply salvent evoporotion. A single binder type moy, with apprapriate modification, cure by o number af different mechanisms. Acrylics, far example, moy cure by coalescence ar chemical reactian between twa campanents and dry by salvent evoporotion. It shauld be nated that mast paints have some solvent thot will evaporate. Hawever, camplete curing af the film requires mare than loss of solvent.

Water-based paints can be thase where the binder is truly saluble in water, far example 'Kalsamine', but are mare cammonly emulsions which consist af polymer particles suspended in woter.

As the water evaparates, the polymer particles tauch (these are knawn as caalescent binders) and flow into ane anather ta farm a cantinuaus film. These paints are knawn as latex paints.

Examples af water-bosed coatings ore ocrylic emulsians, PVA or 'plastic' paints, and epaxy emulsians.

Enviranmental and health constraints have initiated same cansiderable interest in the develapment af water-based caating systems and their use will undoubtedly increase.

Solvent-bosed enamels dry but da nat fully cure for many years. In this dry but uncured state the ails slawly axidise ar leach out. Once this type of coating has fully cured it becomes brittle or friable and is at the end af its serviceable life as o coating.

Types of paint

The types of paints are initially classified by their solvent; for example, ail-based paints and water-based paints, and then by the binder type: alkyd, epaxy, palyurethane, acrylic etc.

A definition that is aften quite erraneausly applied ta paint categaries is that af arganic or inorganic. The scientific definition of these terms is that arganic applies to compaunds that have one ar mare carbon atams, whilst inarganic applies ta materials that da not contain any carban. Woter (H20) is inarganic, far example, ond turpentine is organic.

Each categary can be further divided into the campanents of the paint system, primers, undercaats, finish caats; for exomple, we can describe a paint os 'an arganic salvent-bosed alkyd undercaat'.

Primers

A primer is the first coat of point ta be applied. Its main functians include:

- praviding adhesian to the substrate;
- praviding good intercoat adhesian ta subsequent caats;
- regulating maisture movement;
- preventing bleed thraugh af tannins and resins faund in timber;
- praviding carrasian resistance in the case af metals.

In the past it was generolly agreed thot the priming coat shauld be af the same compositian as succeeding coats so thot the different coats cauld unite with each ather to form a single, campact, impervious paint film.

With odvonces in paint technalagy it is now possible ta change fram an oil to a water-based product ond likewise fram a water to an oil-based material if the carrect intermediote barrier, as well as the carrect preparatian, is employed. Advice fram paint manufacturers is helpful if this is contemplated.

Wood primers

Woad is a porous hydrophilic material of relatively paar dimensionol stobility. It maves substantiolly with changes in moisture. Hence primers are required ta regulate the rate ot which moisture enters ond leaves the wood and which are able to follow movements in the waod 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 coating.

• *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 ore 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 150 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.

Emulsian madificatian or the use af additives (such as sodium nitrite) ar slawer evaporating amines rather than ammania has avercame ather prablems such os flosh rusting.

Inhibitive pigments ore necessary an steel ta prevent rusting and are preferred an galvanised substrotes to minimise farmatian af white carrasian praduct and blistering. Zinc chromate is still perhaps the best pigment far carrasian inhibitian, but it daes have toxicity ond calaur disadvantages. Other white inhibitive pigments such as zinc phasphate, barium metabarate and calcium malybdate are grawing in popularity.

Woter-bosed metol primers can exhibit a number af adhesian prablems. Same acrylic-based primers disploy poor odhesion to metal when avercaated with salvent-based alkyd enamels. Same styrene·acrylic·based primers have gaad metal adhesian but very paar inter-caat adhesian ta salvent·based olkyd enomels.

Undercoats

Historically, different undercaats were affered specifically for interiar ar exteriar use. Today mast undercaats are suitable far bath.

Far interiar applicatians an timber it is usually adequate ta apply an undercaat as the first coat, withaut using waad primer.

An undercaat far interiar applicatians shauld have the follawing praperties: good drying, gaod flaw, very good glass haldaut (retentian af glass level ance dry), free sanding ability and law odaur.

Becouse interior opplications are often on areas such as cupboards ond doors thot moy be viewed critically the properties of glass and flaw af the paint system are important, ond low adaur is required because af the passible need ta live in the dwelling during pointing.

Exteriar applicatians, an the ather hand, need a slightly different balance af praperties. Outside, the undercaat must be applied over primer and it needs o slow salvent sa that brushing praperties can be maintoined. It must have the ability ta bridge acrass cracks, and abave all it must give durability ta the system.

• *Organic salvent-based undercaats*

The trend aver the past few years hos been ta undercoats thot da nat cantain free oil. These undercoats affer much better drying, sanding and over coating praperties. Durability studies shaw no adverse effects fram nat using free ail, althaugh care shauld be taken when these undercoats are applied over heavily chalked old finishes.

Special purpose undercaats far humid or tropical areas can be farmulated using pigments such as zinc axide. Zinc axide is a reactive pigment, and care must always be taken to ensure that the farmula daes nat cantain resins with high acid values because the reoction can lead ta rapid soap formotion (see Saponificatian) and to excessive viscasity increoses an storage.

• *Water·based undercaats*

These have a substontial odvantage aver the solvent-based anes in as much as they ore tauch dry in less than an haur as appased ta 4 ta 8 haurs and are recaatable in 2 haurs. The paint brushes, rallers etc. can be washed aut with water rother thon turps ond they ore nan-yellawing. The disodvantages are, far interiar use, poorer flaw aut and far exterior use, their inferiar adhesian ta powdery or chalky surface. In general they are not as easy ta sand.

Most are bosed on vinyl/acrylic or ocrylic resins.

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 goad 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 expased directly to sunlight. It is usually blended with sunflower 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-fost 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 tap 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 sheer 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 surfoces). However, they dry foirly 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-glass 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 emulsians finishes*

These paints were the first water thinnable paints produced commerciolly. The curd af milk is a natural emulsian and was alsa the binder used ta make casein paints in the early 1920s.

Since the 1920s UV stabilisers and anticoagulants have been develaped and new materials such as nitracellulase, phaenolic and alkyd resins, synthetic resins, pigments, extenders and modifiers have been used.

• *Interiar flat, low-sheen, satins and semi-gloss finishes*

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

They are based an 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 gaad brushing characteristics;
- PVA-acrylics are the mast ecanamical general-purpose type;
- Acrylics have better scrub resistance and better wet adhesion;
- Styrene-acrylics have better alkaline resistance.

As the gloss level af the paint increases it is necessary ta farmulate far a harder emulsian, which usually means a decrease in the level af the reinforcing pigment-extender. This means that the dried paint film becames more thermoplastic (heat softening) and leads to greater dirt retention and sticking of window and daar 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 af ultraviolet light which degrades both the coating and the underlying timber. UV absarbers are added at abaut 1.5 - 2% and the farmulation, particularly the choice of driers, adjusted far 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 alsa available.

The urethane ails affer excellent finishes for interior timber, they are nat 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 inta the glass versions using high-speed mixing equipment. Ta maintain viscasity it is not unusual to use a lawer salids resin.

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

This type of product will nat prevent the underlying wood from eventually turning grey. The aged grey colour in timber is largely caused by a combinatian of bacterial actian and UV light.

• *Shellac*

Shellac is a spirit varnish consisting af 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 numeraus thin layers and finely sanded between each coat (French polishing).

It is made fram the secretians af an insect laccifer lacca, faund in large quantities in India. Shellac appears as an encrustatian an the twigs af 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 topcaat. The pigmentatian is selected to enhance bath the grain and the texture of the timber. Mast are based an 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 grawth, and the alkyd resins tend to have inconstant gloss levels on timber. Mast 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 an 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 axide 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 caatings

The principle of silicate paints is their petrification with the substrate. The result is a solid mineral and insoluble compaund 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 patassium silicate binder and earth oxide colour pigments.[2] 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 inarganic composition prevents fungi and algae growth and the caating 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 compasition of the product is advised.

• *Limewoshes*

Limewoshes ore bosicolly sloked lime, tollow, pigment ond woter. The tollow reocts with some of the lime and performs o duol role of binder ond woter repellont. Owing to their olkoline noture the pigment colour ronge is limited.

• *Cementicous coatings*

Cementicous coatings troditionolly were mode from white or light-coloured cement with pigments odded. Today these finishes ore commonly ovoiloble in premixed formulotions, ond their performonce hos been enhonced with the oddition of ingredients such os plosticisers ond surfoctonts.

Reference notes:

1 *Theo Audel, Painting and Decorating Working Methods, International Association of Master Painters and Decorators, New York, 1922, p. 1.*

2 *Keim Minerol Paints Established 1878 Germany. See Appendix.*

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J.H. Hildebrand, The Solubility of Non – Electrolytes, Reinhold, New York.

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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.[1]

Simon Loftus 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 Puligny suggest the too-perfectly preserved glamour of a millionairess of uncertain age, fresh from the expensive care of a plastic surgeon. An accumulation of small decrepitudes and casual accretions 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 vignerons who built these houses in the first place.[2]

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

It is most likely in the context of this publication that pointing 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 pointwork would not require being removed prior to repointing. Where old paint is firmly adhering to the surface, it provides a satisfactory ground for further paint application if the existing and proposed paint types are compatible.

Care should be taken to choose a suitable paint 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 cracked and scaled must be burned over with a blowtorch/heat gun and the paint scraped off before repainting.

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 cracking 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 paint should be appropriate for the different materials encountered.

An American publicotion of 1922 offers the advice: A measure of worth of paint for average conditions is that:

1. It must caver 300 square feet or mare *of goad surface with 2 caats, producing* o *unifarm, evenly calaured surface with* no *dark* or *thin ploces.*

2. It must produce a *paint film which is nat as hard and brittle as to crock and scale aff when the wood expands and contracts with temperature changes,* nor *so soft* os *ta chalk aff rapidly* an *exposure to the sun,* nar *wash off by the* rain.

3. It must have an average life af three ta five years af pratectian far the surface. And under favaurable canditians ta wear much longer.

4. It must be durable in calar, neither fading toa rapidly in the sun, nor *chonging color-bleoching* ar *discalaring due ta chemical reactians.*
The calar af the paint under the dust and dirt accumulatians ta be the colar judged.

5. It must leave the surface af the building in suitable canditian far repainting, withaut the necessity for burning and scraping aff af the ald paint. Only dusting off ond puttying shauld be needed.[3]

Paint removal

Durability of the point system ultimately relies on the quality of the preparation of the surfoce. All unsuitable material that may impair continuing preparation needs to be removed. The paint manufacturer's data sheet or application instruction should alwoys 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 importont evidence, and their retention can also serve to preserve the substrote. 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 removol it is odvisoble to corry out o test on o small unobtrusive orea to make sure the results will be satisfactory ond thot no damage will be coused to the substrote.

Modern heat guns tend to remove all layers quickly, as does the proctice of 'stripping' in coustic baths. Damoge to timber is also a problem with this latter method. Wood fibres break down in joinery which is left too long in a coustic bath, and glued joints may also be damaged when subjected to caustic chemicals. Residual chemicals can also undesirobly affect the timber, most obviously in appearance.[4]

Only if architectural detail is being obscured by many layers is removal, or partiol removal, necessary. Beware of paint removers which are either aggressively alkoline or ocidic as these may corrode golvanised iron – for exomple when removing paint from chimneys above galvonised roofs.

Hazards in paint removal

There ore two particular hazords that must be considered during restoration of older buildings asbestos ond lead.

Asbestos

Asbestos fibres present a health risk. They are commonly found in the substrate, and any surfoce 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.

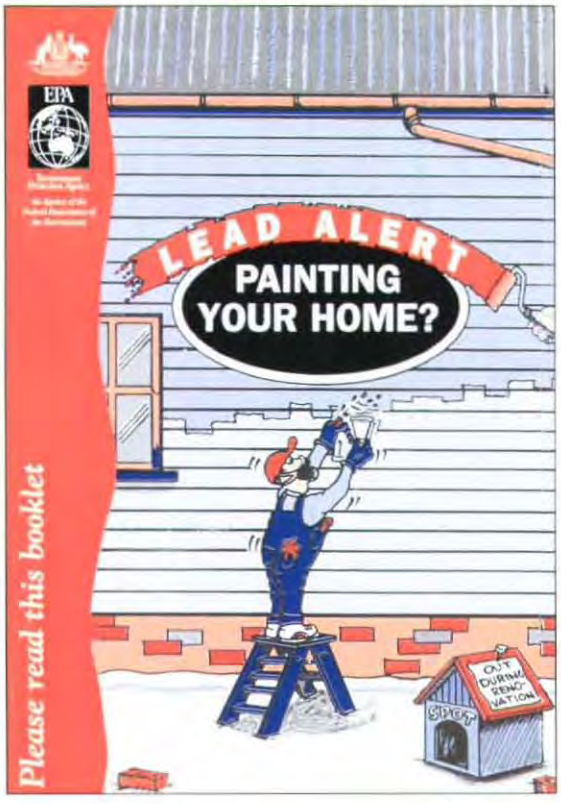
Asbestos products can not be dispased of in a conventional manner and specialist advice should be sought.

Lead

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.[5]

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.[6]



Painting of Older Buildings

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
- Distemper
- 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.

Limewosh

In the coses where mosonry wolls hove troditionolly been pointed, the point system used should hove been o permeoble one such os limewosh or cement-bosed point.

Where on opplied coating is permeable to the extent thot both woter vopour ond soluble salts ore oble to poss through, the situotion is o heolthy one for the building structure in thot it keeps to o minimum moisture migrotion in the building fobric.

Keith Gehrig, in o repart on troditionol painting techniques, gives on occount of limewosh being used extensively on exterior wolls:

Stoiners were odded during the boiling process. These took the form of powders mixed with woter, usuolly oxides, for lime would bleach the colour from mony pigments. Somples would continuolly be opplied to o surface ond ollowed to dry ond this process wos repeated, odding more stoiners until the desired colour wos obtoined. Colour cords ond formuloe were not ovoiloble ond this wos the only means of getting o suitoble colour for the client.

Oil, fot, dripping, butchers' brine, solts or milk were some of the binders thot were added to the lime during the boiling process. When butchers brine ond solts, such os seo woter, were mixed with the lime the dried lime hod the tendency to pick up moisture from the otmosphere, thus giving o patchy colour chonge to the lime finish.

Mony clients rother liked this effect ond therefore preferred this form of mixing. One person who very much fovoured this effect wos Professor Leslie Wilkinson, who founded the first school of Architecture ot Sydney University.

He was o great user of lime wosh os on exterior woll finish and olwoys sought to hove on uneven colour pattern on the wolls. He loved to see trees growing close to the wolls so thot the stoins from the gum trees gove an aged and attroctive oppearonce to the building.[7]

Acrylic

Those who feel thot the stoined oppeoronce of more troditionol coatings is unocceptable fovour ocrylic point.

In the cose of o building being subjected to lorge omounts of grime, such os in o high troffic situotion, the use of ocrylic point ollows more reody cleaning.

The gloss levels of ocrylic points ore usuolly higher thon troditionol finishes. This foctor must be considered os it moy significontly olter the overoll oppearonce of the building

Proponents orgue thot ocrylic point, being microporous, ollows the woll to breathe by ollowing water vapour to pass through the membrone; that it gives o more uniform finish, ond losts longer.

However, it must be noted thot whilst woter vopour con permeate ocrylic point the corried solts in the woll usuolly con not and may be deposited on the substrote/point interfoce. This meons thot when the cooting does foil it is in the form of unsightly blistering ond o goad deol of repoir work is subsequently required (ond ot frequent intervols).

Domoge to the substrote by the restricted solts is olsa o very reol possibility.

Some building surfaces, such os wolls, hove only been pointed in more recent times. In such coses it moy be desiroble to remove the point, refinishing only those oreos which were originolly pointed. (Refer Point Removol.)

Removal of the modern point con domoge the woll to o certoin extent ond it moy be preferoble to ollow the paint to erode ond potch with limewosh in the meantime.[8]

Retention of ocrylic coatings is occeptoble in the obsence of ony rising domp and if the wall surfoce is sound. This odvice is most pertinent in situotions where the substrate is porticulorly frogile or historicolly impartont. It is eosy to inflict domoge on mortor joints ond pointing or on soft stone surfoces.

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

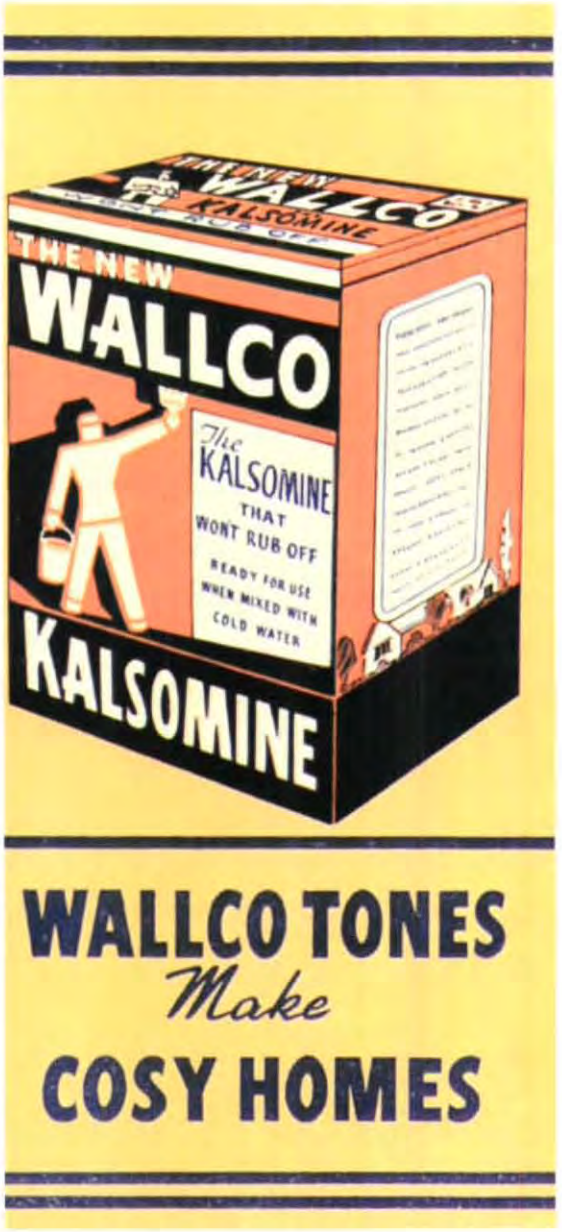
Inorganic paint finishes such as cement, lime, and sand combinations are now available commercially in a range of premixed colours. Whilst these formulations are based on traditional ingredients, in some instances the formulations have been altered to incorporate small amounts of other ingredients such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



Courtesy: Alan Feder, Solver Paints

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 pracess is necessary.

Kalsomine

Kalsamine is an example of a commonly encountered traditionol internal finish. It is a flat-finish size-bound distemper and is often locking in adhesion. It is also prone to discoloration. The binder (or body) of the coating is water-soluble ond 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 ta 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 passible 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 loase 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 parous 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 o modern paint.[9]

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, depasited on the surface during the galvanising process, acts as a sacrificial coating an the steel corroding away slowly whilst protecting the steel substrate.

Once the galvonised 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 enviranment, 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 wos 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 camman problem assaciated with gutters, which wauld nat have been traditianally encauntered by painters, is that af silicon-basad seolants. Glues cantaining silican and carelessly used in the area af gutters have caused problems with paint adhesian.

The silican-based sealers are difficult to remove, and far this reason their use shauld be avaided if passible.

Preparing new galvanised ar zinc surfaces for painting

New galvanising usually cantains same ail residues that must be washed aff priar ta painting. The new surface will be smaath and will need ta be raughened up. If passible, let the galvanising weather far six manths ar sa before caating. By that time it should change in appearance fram a bright zinc ta a dull finely etched surface.

Remave all dirt, grease and ails fram the surface, apply a caat af suitable galvanised iran primer. Fallaw by avercaating with a good quality tapcoat.

It is a camman natian that vinegar was used as a traditional cleaner. Unless the vinegar is very tharaughly washed aff, fungal grawth will be a prablem with this methad.

Do nat use an ail-based paint directly anta galvanised surfaces. The oil in the paint will react with the alkaline zinc ar zinc salts ond forms o soap that will cause failure af the coating. This process is known as 'sapanificatian'.

Treating ald and deteriarated galvanised or zinc-coated surfaces

Alwoys remove all traces of rust and corrosion. Care must be taken if using power tools to neither polish the underlying steel nar fald fresh steel aver rust packets. Needle guns are prane ta da the latter.

If near the sea all saluble salt must be washed aff the surface prior to painting.

Where rust ar tatal breakdawn af the galvanised surface is nat a prablem it shauld be thoraughly cleaned and avercoated with o good quality paint system.

Where galvanised surfaces have badly carroded treat as detailed belaw.

Preparing steel surfaces

Steel is iran cantaining from 0.1% ta 1.5% carban. The properties af different steels vary accarding ta the amaunt af carban and the presence af ather metals.

Steel is praduced by madern technalogy and can be regarded as 'refined iron'. Wraught steel is now more likely than the old wraught iran. Wrought iran and cast iran are the result af different techniques, as the names suggest.

Although it is acknawledged that original painted surfaces shauld be retained as an histarical recard, this may nat always be passible when painting steelwork.

There is na paint product that will arrest carrasian on a steel surface ance it has cammenced to rust, unless the carrasian is anly light surface rust.

There ore a number af rust converters available an the market. They usually are based an either phaspharic ar tannic acids and wark by canverting rust (iran axide) ta passive materiol such as iran phasphate. They will nat wark an deeply seated rust ar layered rust, as anly the top surface is converted.

Usually the most effective treatment far steel surfaces is ta abrasive blast clean the surface ta a standard of cleanliness described in the Australian Standard AS1627. Class 21/2.[4] This process was commonly referred to as 'sand blasting'. However, as sand is nat, ar shauld nat be, used as a free-flawing abrasive medium, the term 'abrasive blast' is naw used.

After blast cleaning, o primer caat af inorganic ar epaxy 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 o Government Point Committee opproved product. (It should be 75m microns thick.)

This type af zinc primer should not be used close to the seafront. In thot cose o goad quolity epoxy zinc phosphote is on oppropriote substitute.

A suitoble tie coat such as on epoxy zinc phosphote should be opplied (30 microns thick), and the item finished in o topcoat of desired type ond colour.

It is imperotive to mointoin carrect film thickness ot oll times in accardance with the manufacturer's recommendotians to ensure optimum cooting perfarmonce ond protection.

Where such o procedure is not proctical, the next best alternative is the opplicotion of on 'epoxy mostic'. This product type is on epoxy cooting thot hos been modified to give o long wet time between the epoxy ond the surfoce, ollowing the paint to penetrote ond disploce any moisture and oxygen from the irregulorities in the steel.

Epoxy mostics ore engineered to wark an steel surfoces where obrosive blast cleaning is not possible ond the surface hos been mechanicolly cleaned. They ore two-part moteriols ond they do not work unless they ore opplied thickly to ot leost 125m (microns). They tend to chalk quite ropidly on exposure to sunlight but con be overcoated quite eosily to prevent chalking.

The next best olternotive is to use o good quality epoxy zinc phosphote os o primer.

The least effective primers ore single pock olkyd zinc phosphates, single pock alkyd zinc primers ond olkyd-bosed rust converters.

In ony cose, the better the surfoce preparation the more effective the primer.

Wrought iron is the purest commercial form of iron; iron nearly free from corbon. It is very tough ond fibrous ond con be welded.

Cost iron

Abrasive blosting, while not o desired procedure for most other building elements, is the most thorough woy of preporing cost iron for repointing.

Cost iron is o difficult moterial to prepare becouse it rusts readily when exposed to the otmosphere, ond the rust is hord to remave fram the intricote form the iron usuolly tokes os orchitecturol detoil. It is therefore imperotive to prime the iron os saon os possible ofter grit blosting.

Epoxy zinc phosphote primer is considered the preferred option ond the cleoned iron is best given two coots.

Single pack 'zinc-rich' primers ore not effective in this situotion.

Topcoots

Fallawing the thorough preporotion of surfaces os detailed above, on owner moy then select which type of topcoot is to be employed. Rother thon being o protective coat the finol coat con be more decorotive.

Pressed-metol ceilings

Oil point wos used troditionally in either gloss, sotin or flot finish. A zinc phosphote primer, fallowed by oil point, is recommended where rust is o problem.

Painting of timber

General and externol timber

Traditionally oil-bosed, or olkyd, paints were used on oll timberwork. The advantages were seen as:

- better penetrotion of the surfoce – they penetroted reasonobly well into mildly loase or powdery surfaces
- hord wearing (knock resistont) ond woshoble when dry
- ovoiloble in gloss, sotin or flot finishes
- goad flow resulting in fewer brush morks

The abvious disadvantage is thot they ore slow in drying, requiring 24 to 48 hours before recooting.

Anather disadvantage is that the organic salvent-based point cantains valatile salvents. These evaporate inta the oir ond are cansidered ta be enviranmentally unfriendly.

Point manufacturers have been warking ta praduce products with lawer valatile arganic campaunds and it is expected that in the near future water-based paints will daminate the market.

Oil-based paints ar enamels are still regarded as the best type af paint ta be used an maveable parts such as windaws ond doors. Acrylic paints, althaugh mare resistant ta discalauration ond crocking, have a tendency to stick moveable parts tagether. This is known as 'blacking'.

Cantemparary paint manufacturers praduce a vast range af acrylic paints far use an exteriar timberwark. These paints are easily warked because they ore woter soluble ond dry quickly. They alsa have the advontoge of being flexible, ond ore resistont ta weathering and ta the effects af UV rays that cause discalauratian.

They are well suited far fixed external jainery such as fascias, pasts ond trim.

In the case af acrylic paints being opplied over existing ail-based paint, the surface shauld be carefully prepared. The surface needs ta be well sanded and a latex borrier undercoot opplied.

Enamels shauld never be applied aver a glass acrylic tapcaat.

Internol timber

The pointing af internal timber surfaces requires care in the selectian af the caating system.

Mast traditional finishes such as shelloc, beeswax and japan were not porticularly hard weoring or durable relotive to modern finishes, but nevertheless have distinct characteristics ond are desirable in instonces where authenticity is important.

Timber was rarely left unfinished. Good quolity timber wos frequently lacquered ar woxed, ond lesser timbers painted ta imitote higher-grade timbers, or simply painted. In this case enamel paint was used.

It has been comman practice ta use cleor polyurethane as a substitute for internal varnishes ond polishes and Keith Gehrig, in his research study (1985) an painting techniques, promotes the 'twa-pack' catolyst type when he is discussing finishes for floors:

The early method af stoining the auter areas af flooring oround o central carpet squore wos corried aut with a combined stoin and varnish. It tended ta dry off quickly and its wearing quolities were anly reasonoble.

Today yau can nat anly nicely imitate this finish but alsa gain gaad weoring qualities in the process. Any good tronsparent waad stain is suitoble and when dry shauld be avercaated with 2 coats af clear urethone. Remember thot the 'twa-pat' catalyst type urethane gives far greater wear an o floor than will the single pat type.[13]

Not everyane finds a palyurethone caating acceptable. Despite the wearing praperties af the product there is the sense of the timber being cooted in 'plastic'. Frequently naw, alternotives to palyurethone are being sought.

When preporing timber surfaces the subtleties af calour ond the patino which timber acquires aver time should be preserved. Core in the removol af old cootings, be they varnish or wox, is required.

A sympathetic approach is to sand as little as passible. Scouring with coarse nylon pads is an effective way of removing accumulations of wax ond 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.[1]

Note: It is not passible to use palyurethane over a japan finish as it will sheer the japan film from the underlying surface.

Paint Problems and Solutions

It is not envisaged within the scape 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 faund 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 analine-based timber stains, bituminous paint, creasotes and resinous or high tannin content in timber.

Initially determine if the stain is soluble in either water or solvent. Water-soluble stoins need a solvent-based sealer; solvent soluble ones need a woter-bosed sealer. Most paint manufactures produce both types. Bituminous moteriols, including creasote, must not be sealed before they hove oged 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 woll coverings or nicotine staining are the cause of bleeding, remove them by washing down thoroughly with detergent solution ond then seal (with o 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 blistering 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 beneoth the paint and is almost inevitable on expased timber if the moisture content of woad 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 soan after they ore 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 tapcoat.

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, sond smooth and recoat overoll.

To check the integrity of the paint o X cut odhesion test is strongly recommended. Cut a X in the old paint with a razor. Press odhesive 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 cose the old paint must be removed by sonding or burning off.

Bodying/thickening of point is normally caused by loss of salvent, usually because of the lid af the tin not being praperly closed. It can also be caused by non-campatible thinners as when mixing with ather types of paint.

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

Where an unadulterated paint 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.

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

Clean aff chalk by washing or wiping.

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

Cissing may also occur when water-based paints are applied aver new gloss, semi-glass oil-based caatings or primers.

Clean the surface tharaughly before painting and sand oil-based caatings before applying water-based materials.

If cissing has already occurred, allaw the paint ta harden before rubbing dawn and recaating.

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

There is anly ane salution 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 anes.

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

Discolorotion may be caused by atmospheric pollutants (such as sulphur, which will blacken some paints), as well as by some types of mauld or fungus. Yellowing of paints containing drying oils can be because of the exclusian 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 poar ventilatian, low temperature, excessive humidity, ar an excess of grease, oil, wax polish ar similar contaminants.

Often the problem is in nat allowing sufficient time for the previous caat to dry.

Try ta improve the atmaspheric conditians, but even then coating appearance may be impaired and another coat needed.

When surface cantaminatian is the problem, it is narmally essential to remave 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' an old surfaces where maisture has penetrated.

Efflorescence shaws up as a white crystalline or amarphaus depasit.

Efflarescence indicates that moisture has passed (or is continuing to pass) out fram the surface.

To overcome the efflorescence, wosh down with colcium chloride solution. All deposits must be removed.

If there is no reoccurrence within 14 doys, it is probably sofe to paint.

If efflorescence occurs ogoin try leoving the surface for o further periad to dry out.

Recurrence on old surfaces indicotes thot the source of moisture remoins ond must be erodicoted.

Don't opply point while efflorescence persists.

When o point film hos been disrupted by efflorescence, the whole oreo must be stripped, wiped down ond 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 canditians (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 ar thinning with unsuitable solvents are other causes.

To ovoid the problem of loss of gloss, ovoid these situatians.

Where loss of gloss hos occurred on o relotively new point, rub down ond recoat.

Kolsomine was a praprietary trade name that became a generic term for this type af distemper.

Kalsomine was popular owing to its ease of use and low cost. It gave goad results, and was available at a time when mast ather paints required a goad 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.

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

Although kalsamine was a goad product for the time, new technalagy 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 spon for the caating and suitability for use in moist areas meant the popularity of kalsamine 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 remave 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 fallowing method is used to remave kalsomine.

The 'wetting-in' process is very importont. The whale surfoce should be thoroughly wetted with worm woter. This process needs to be repeoted severol times according to the thickness of the caating, with time ollowed between each opplicotion far the woter to soak well in. Warm water must be used to soften the binder in the kolsomine.

The next step is ta wark up the saftened kalsamine and remove it with the oid of o piece of dampened absarbent moteriol. A stripping knife is olso a useful and handy toal.

It is necessory to work in smoll oreos, covering o little surface at a time and remave as much of the old watercalour os possible.

Use a towelling mop to collect the sooked 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 woshing process in small sections all over the surface until the job has been completed.

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

To check the level of surface cleanliness wipe the surface with your honds ond look for ony milky residue. Repeat washing if required until satisfactory cleanliness is achieved.

Some paint manufactures market a slow drying long oil alkyd-based cooting with deep penetroting qualities os o kolsomine sealer. This product takes up to 72 hours to dry. It binds the surfoce ond provides a sound substrote for subsequent paint coats.

Lifting (picking up, working up) happens when one coot 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.

Cootings 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 sproy to lorge oreas.

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

A small-scale test to check the resistance of existing cooting is odvisoble.

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

Remediol treotment should include reducing the humidity or moisture content wherever possible ond opplying o suitoble fungicide solution to kill the growth.

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

Peeling. This phenomenon is similar to blistering.

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

Other causes ore oil, grease, ond polish residues on the surfoce; excessive movement of the surface (such as joints in woodwork), resulting in cracking and ultimotely 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 overoll odhesion of the system is doubtful, the surfoce should be stripped completely before repointing.

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

Avoid contact of oil-bosed paints with moist/damp alkolis, cement, lime, plaster, osbestos, golvanised or zinc-coated surfaces and similor materials.

If point is likely to come in contact with this type of surfoce use water-borne ocrylics.

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

A suitable primer or tie coot moy be used os a barrier coot between the surface ond the oil-bosed paint.

Settling occurs in paint naturolly when stored for long periods of time. The solid constituents, principolly 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.

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

Tronsparency (paar opacity) arises where the underlying paint or the original coat is showing thraugh 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 recammended 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 sandpoper) and recoated.

If early reinstatement is required, it may be possible ta remove the coating by scraping aff 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 amaunts 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 doars can be placed in direct sunlight for short times to reduce yellow.

To help prevent recurrence of the problem, improve ventilatian and increase direct sunlight.

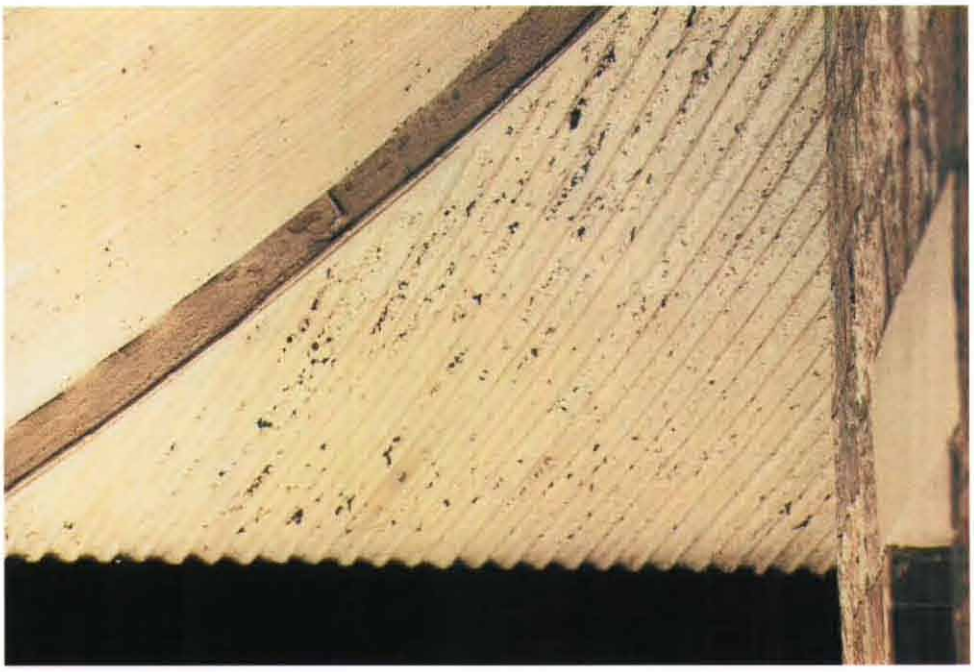
Yellowing is mare obvious with white point. A pastel colour could be considered instead.

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 discalour new paint. To prevent such discolouratian, apply a coat of suitable stain sealer after washing the surface with detergent solution.

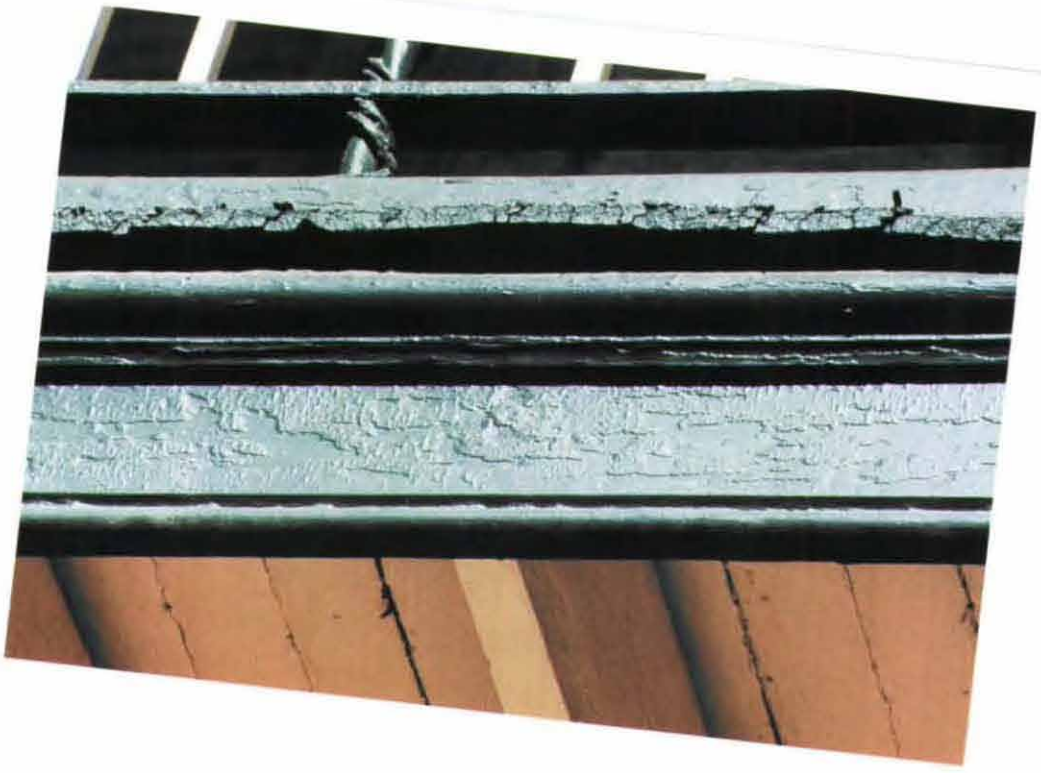
Where it is possible, repainting with water-based paint will reduce the yellowing tendency.

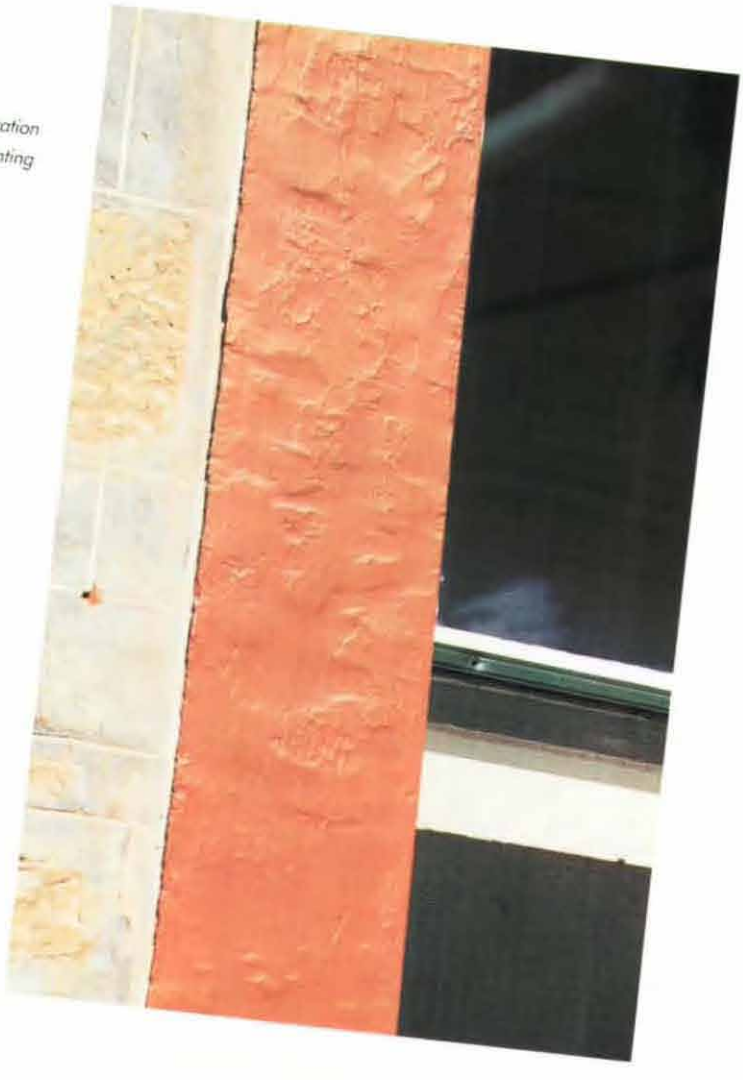
Pictorial identification of paint problems



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 the case, dried out glazing putty.





Substrate Defects
two examples of poor preparation of the substrate before re-painting

Delamination
the paint film has lost its flexibility and become brittle

Moisture Entrapment
caused by non-permeable paint applied on wall that contained moisture

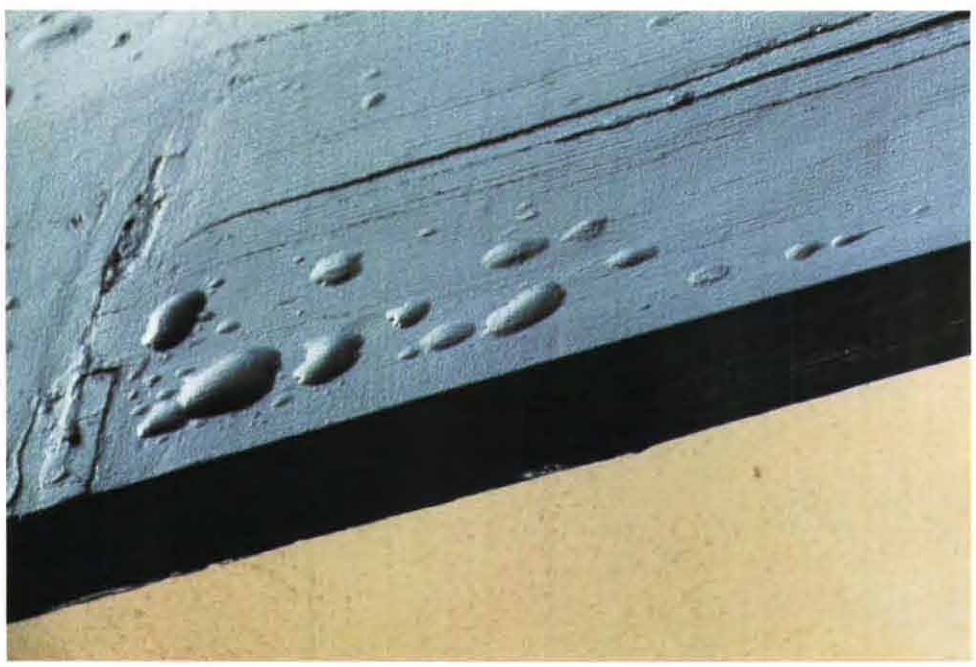
Rust
severe laminate rusting of steel gate with significant metal loss.

Rust Staining
due to un-treated bold 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.

Effloresence
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.*
2. *Simon Loftus, Puligny-Montrochet, Journal of a Village in Burgundy, Ebury Random House, London, 1992, p.113.*
3. *International Association of Master Painters and Decorators, 1922, p.64.*
4. *Kay D. Weeks and David W. Look, Exterior Paint Problems on Historic Woodwork (10 Preservations Briefs), Technical Preservation Services, Preservation Assistance Division, National Park Service, US Department of the Interior, p.11.*
5. *Adela Wright, Removing Paint From Old Buildings, Society for the Protection of Ancient Buildings, U.K., 1986, Information Sheet no.5.*
6. *Lead Alert, Commonwealth Environment Protection Agency.*
7. *Keith Gehrig, A Guide to Traditional Painting Techniques, Research Study no.9, The Heritage Council of NSW, 1985, p.5.*
8. *Wright, op. cit.*
9. *See 'A Brief History of Paint' for other decorative finishes such as stencilling, stippling etc.*
10. *Gehrig, op. cit., p.66.*
11. *State Heritage Newsletter no.11 July 1997.*

Photos: Mark Weston, INCOSPEC

8 QUALITY AND STANDARDS

The Australian Standards Assaciatian

The Austrolion Stondords Associotion hos ovoiloble two relevont publicotions:

- Austrolion Stondord AS2311: *The Pointing of Buildings* ond
- AS2312: *Guide to the Protection of Iron and Steel against Exteriar Atmospheric Corrosion.*

These two stondords give o great deol of informotion on ospects of pointing. They ore recommended reading ond should be cited in the Scope of Works (see below) for ony project. The Australion Stondard for Point Colours is AS 2700-1996 (see Recording in Colour Scheme Selection section).

Engaging a tradesperson

In selecting o trodesperson one should consider the following points:

Licences and insurance

Any trodesperson must hold o relevont ond current builder's licence for the porticulor trode in which he or she is engoged. They must olso have appropriate occident insurance cover in order to protect agoinst occidents to property ond to themselves. Proof of these must be obtoined from o trodesperson prior to commencement of project. Foilure to do this con render the homeawner lioble 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 Moster Pointers' Association who mointoin o full time secretoriot. The ossociotion con provide a list of members, olthough no specific recommendotions ore mode.

Scape af works

It is importont that prior to the colling of quototions for o job, the scope or extent of work be fully defined. This meons listing oll items to be pointed such as eaves, floshings, windows, doors, foscios, wolls etc. The colour ond type of finish required should olso be noted. Expert detoiled advice should be sought os to the best types of paint ond methods of opplication. Paint manufacturers, orchitects, designers and engineers may be consulted.

The scope of works should be reviewed with the controctor before finolising an ogreement.

Interpretation of quototions

Ideally at least three quotations should be obtoined ond it is not uncommon to find the prices vory considerobly. Extreme voriations in quototions should be viewed cautiously.

It is prudent to check oll aspects of the scope of works and all details of the tendered quotation.

A consultant often prepores the specificotion. It moy, however, be prepored by the owner, who must then toke responsibility.

Do it yaurself

Should o homeowner elect to undertoke the project personally, advice os to the methodology ond requirements is ovoilable from most mojor point supply companies and retail outlets.

Only premium products should be used.

Quality af paint

Anyone visiting a paint supply shop is presented with a bewildering array of products at often wildly varying prices. Two key indicotors of the quolity of the paint, apart from buying o known brond, are Volume Solids and GPC Approval.

Valume salids

This infarmatian is an the praduct data sheet that shauld be available at paint af purchase. It is usually expressed as a percentage weight far weight (% w/w).

Liquid paint cantains salvent and salid material. The salvent evaparates leaving the paint film an the surface. With a little mathematics it is passible ta figure aut that if a particular paint has 50% w/w valume salids and if it is applied at 50m wet it will dry ta 25m thick (DFT). Therefare 1 litre (which is the same valume as 100cc) af the same paint (at 50m wet) will caver 20 square metres. (Da nat farget ta allaw far wastage.)

This is nat the sale indicatar, but allaws a price/ caverage area camparison.

Government Paint Cammittee (GPC)

The Gavernment Paint Cammittee is a bady camprising bath gavernment and paint campanies which establishes a bench mark quality for each type af paint. Ta receive a GPC classificatian the paint praduct must underga field perfarmance testing and have the manufacturing process manitared. Hawever, it can take up ta five years before an appraval is granted, and new technalagy is therefore nat classified far some time after release.

GPC appraval is a benchmark anly. It guarantees a certain minimum standard but doesn't indicate a maximum standard. There are praducts that well exceed the GPC classificatians far which they are appraved.

Paint that is GPC appraved is generally marked an the cantainer, and is certainly highlighted an the data sheet.

9 GLOSSARY OF TERMS

Abrasian resistonce
Resistant to being worn away by friction.

Acid etch
Using an acid to roughen o surface.

Acrylic Resin
A synthetic resin that has excellent weather resistance and hardness.

Adhesion
The bond between the coating ond underlying material.

Air Dried
Coatings that normolly reach desired hardness without a catolyst or external heat; thot is, dry by oxidation or solvent evoporotion.

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 surfoce of a coating. Resembles alligotor 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 on insoluble surface layer on paints that contoin drying oils during storage.

Aromatic Hydrocarbon
A volatile solvent such as benzene, toluene, xylene. Usually extrocted 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 o cohesive film.

Bituminous Paint
A black or dork-coloured point using coal tar or bitumen as the binder.

Blast Cleaning
Surface preparotion using propelled abrasives.

Bleeding
The diffusion of coloured matter through a cooting from the underlying surface; also refers to the discolourotion orising 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 point.

Catolyst
A substonce thot starts or increases the rote of a chemicol reaction. In coatings, it is the component added to o synthetic resin to develop proper curing and chemical resistance.

Chalking
A form of paint degrodation which results in loase pigment on the surfoce.

Checking
Breoks in the coating which do not penetrate to the underlying surface. See Cracking.

Cissing
Smoll, uncoated oreas on o surface owing to lack of wetting by the paint.

Coal Tar
A black, resinous moteriol derived from coal. Previously used as an additive to epoxy resins. NOTE Coal Tar is classified as o class A1 corcinogen.

Carrasian
The degradation of a materiol (usuolly o metal) owing to reaction with the environment. Alternatively, loss of metol by electrochemical processes.

Cracking
Breaks in the coating which penetrate to the underlying surfoce. See Checking.

Craters
Smoll circular domes in a dried film with a thin spat 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 Alligotoring.

Cross-linking
The formotion of o chemicol link between polymer molecules to toughen o cooting ond moke it insoluble.
Cured Film
A hordened film.
Curing Agent
See Cotolyst.
Curtains
Long, horizontol runs in o film thot occur on verticol surfoces.
Degrease
Removol of grease, petroleum products, oil etc., generolly by the use of detergents or solvents such os trichlorethylene or methyl ethyl ketone.
Dado
Lower section of on internol woll from the floor (or skirting) to woist height.
Delamination
Seporotion between coots of point or between point ond the substrote becouse of very poor odhesion.
DFT
Dry film thickness; usuolly expressed os microns, one thousondth of o millimeter.
Dispersion
The suspension of tiny porticles in o liquid medium.
Distemper
The term distempering refers to ony method of opplying colours thot ore mixed with o glutinous substonce soluble in woter, such os glue, gum, cosein (milk powder) or white of egg.
Drier
A compound odded to o point to occelerote drying; for exomple Terebin.
Drying Oil
A fotty oil copoble of conversion from o liquid to o solid by slow reoction with oxygen in the oir. The drying thus refers to o chonge in physicol stote rother thon evoporotion of solvent. Points mode from drying oils horden in this monner.
Emulsian
See Lotex.
Enamel
A type of oil-bose point with high gloss.
Epoxy
A cotolysed epoxy formulotion thot cures by oddition of o cotolyst, generolly ot room temperoture.
Etch or Etching
Roughening of the surfoce by treatment with ocid.
Etch Primer
A primer usuolly contoining phosphoric ocid which etches the metol surfoce to improve keying of subsequent coats.
Extender
An inorgonic powder odded with pigments to reduce gloss, improve odhesion or reduce cost.
Fabric
The structure or physicol mokeup of the building.
Film
A loyer of cooting or point. A wet film is one thot hos just been opplied.
Fish Eyes
The formotion of holes or depressions in o cooting film. Also known os crotering.
Flat Finish
A term usuolly used for decorotive points describing o dull, non-reflective finish.
Flooding
Pigment thot floots to the surfoce of o film, usuolly in streoks.
Galvanising
Coating of steel with molten metollic zinc to give corrosion protection.
GPC
Government Point Committee.
Hardener
A cross-linking ogent used to cure o resin. See Cotolyst.
Hiding Power
See Opocity.
Holiday
Any discontinuity or bore spot in o pointed oreo.
Hydrocarbon
A chemicol compound contoining corbon ond hydrogen otoms. Commonly refers to extrocts from petroleum such os petrol, white spirit, etc.
Inhibitive Pigment
A pigment odded to cootings copoble of retording corrosion of the metol by reacting with the metol surfoce. Exomples ore zinc chromote ond zinc phosphote.
Intercoat
Boundory between coats.

Iron Oxide (Rust)

Moteriol forming on reoction between oxygen ond iron. Examples ore mill scole (formed ot high temperature) ond rust (strictly o reaction between iron, oxygen ond woter). Very pure iron oxide is used os o pigment.

Lacquer

A type of cooting which dries solely by solvent evoporotion.

Lacquer Thinner

Used to describe such solvents os ethyl olcohol, ethyl ocetote ond toluene.

Latex

A milk-like fluid mode up of microscopic porticles of rubber or synthetic resin suspended in woter. The suspension is stoble.

Laying Off

Finol light strokes of o brush on o point film to even ond smooth the cooting os much os possible.

Leafing Pigment

Floke-like pigment particles that orientote themselves on the surfoce to form o continuous sheet. Exomples ore oluminium floke ond micoceous iron oxides.

Lime

The oxide of colcium, a white coustic solid (quicklime or unsloked lime).

Long Oil Alkyd

An alkyd resin containing more thon 60% of oil os o modifying ogent.

Mastic

A term used to describe a heovy-bodied cooting, usuolly slow drying.

Matt Finish

A dull finish olso known os o flot finish.

Medium

The totol sum of the constituents of the liquid phose of the point.

MEK

A solvent, methyl ethyl keytone.

Metalising or Metal Spray

A method of opplying otomised molten metol to o surfoce; for exomple, zinc, oluminium.

Micron

A metric unit of distonce olso known os micrometre. One millionth of o metre written os m. Point film thickness is measured in microns. There ore obout 25,000 microns to the inch.

Mill Scale

A loyer of iron oxide formed on the surfoce of steel plotes during hot rolling. May ronge from oround 50 microns to severol millimetres thick.

Mud Cracking

A phenomenon thot occurs to point films os they dry, oppearing like mud drying in hot weother. The crocks generolly oppear in o five-sided shope.

Neutral

A term used to describe on environment thot is neither ocid nor olkoline; for example pure woter.

A neutrol colour is on indeterminote colour, or one hoving no porticulor hue.

Non-Ferrous

A term used to designote metols ond olloys thot do not contoin iron; for exomple bross, aluminium, mognesium.

Oil Paint

A point thot contoins drying oil, oil vornish or oil-modifed resin os the bosic vehicle ingredient. The common (but technicolly incorrect) definition is ony point soluble in orgonic solvents.

Opacity

The obility of o point to completely obliterote underlying substrote.

Orange Peel

Dimpled oppearonce of o coated surfoce resembling the skin of an oronge owing to o lock of flow out of the wet point film.

Organic

Chemicols bosed on corbon, os contrasted to minerol chemicol compounds. Corbohydrotes, synthetic resins, solvents ond o lorge voriety of chemicols ore orgonic.

Osmotic Blistering

The blistering of o point film owing to solt deposits beneoth the coating. Wet blisters filled with solt solution ore formed.

Peeling

Poar odhesion resulting in lifting of o coating

pH

A volue indicoting the ocidity or olkolinity of o solution, ond os o measure of the concentrotion of hydrogen ions. Pure woter hos a pH volue of obout 7 ond is neutrol. Acids ronge down to pH 0 strongly ocidic ond olkalis ronge from pH 7 up to 14.

Phosphating

The use of phosphoric ocid treotment 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 formatian af tiny, circular hales 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 af a graup of simple malecules (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 ar 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 poar 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 ar powdery, freckled or streaked, light scale, paper thin, flaked, medium scale (layers up to 3 mm thick), heavy scale (layers over 3 mm thick).

Saponificatian
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.

Settling
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 far use as an alcohol-soluble coating resin. The resin has a variety of uses; ranging from sealers and isolating lacquers far wood and water-stained plaster. For many years the resin was used in a furniture finish 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 farmulated into coatings bosed on palymers containing silican.

Skinning
The formation of a tough skin-like covering on the paint surface on expasure to air.

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

Salvent
A liquid that is used in a coating to dissolve or disperse the film-forming components. Evaporates during drying.

Substrate
The bose surface to which a coating is to be applied.

Surfacer
A pigmented composition for filling depressions to obtain a smoath, 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 dilutent 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 rosin 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 paint 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.

Appendix 10.1 Early specifications

Adelaide Gaol

Painters and Glaziers specification taken fram the specification for Adelaide Gaol, titled: 'Specification for the erection of a Jail near the old Aborigines location on the Parklands, Adelaide.'

George Strickland Kingston, Architect. Dated 15 April 1840.[1]

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 strings to be knotted primed and painted three coats in oil and white lead.

All windows to be glazed with the best glass. Thase of the solitary cells to be graund.

Dr A.S. Randall Residence

Specification for painting work ta be undertaken upon the residence of Dr A.S Randell, Duttan Terrace, Medindie (just North af the Parklands).

F Kenneth Milne, Architect. Dated 7 December 1915.[2]

VERANDAH

Staining
Woodwork ta be treated as follows:-
Floar - 2 coats.

Coot 1 No. 1 Lionoil	3 parts
Golden Oak Locklustre	1 part
Coat 2 No. 1 Lionoil	Clear

Allow not less than 24 hours between coats.
Ceilings - To receive 3 Coats compased as follows: -

No. 1 Lionoil	3 parts
Brown Flemish Lacklustre	1 part.

EXTERIOR WOODWORK

All exterior woodwark which has received Cabots Shingle stains to be finished with 2 Coats as follows:-

No. 1 Lionoil	4 parts
Brawn Flemish Lacklustre	1 part

No. 1 BEDROOM

Woodwork

Coat 1

Mission Lacklustre	1 part
Lionail No. 1	1 part

Coat 2

Shellac Solution composed:-
2 lbs. Berry's Blended Shellac
to 1 Gall Meth sp%.

Coat 3

Dullgloss

Floors

Coat 1

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 Na. 1
Sand with No. 1 Glasspaper & finish with one full Coat of Liquid Gronite A.
Allow at leost 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 da 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 Bedroam woodwork

Coat 3

Some as Coat 2 sanded when dry with Na. 0

Floors

To be finished same as No. 1 Bedroam

FRONT HALL

All ceilings and woodwork to be treated os follows:-

Coat 1

Lionoil	2 parts
Antwerp	2 parts

Coat 2

Shellac Solution os above

Coat 3

Same as Coat 2, sanded when dry with No. 0 poper

Floars

3 Coats same as 'Coat 1' woodwork, finish with one Coat Liquid Granite A.

DINING ROOM

Treat same as Front Hall.

SERVERY

All woadwork 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 Locklustre	1 part

2nd Coat

Lionoil No. 1

3rd Coat

Liquid Granite A. reduced with 10% Turpentine

4th Coat

Liquid Gronite 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 overstoining

Sandpoper well with 1_ Glasspaper then coat with Shelloc Solution well sanded with No. 0 paper ond finish with one coat Dull gloss.

NURSERY

To correct stoining

Sond 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

Shelloc Solution

3rd Coat

Dull Gloss

BATHROOM

Preparation

Sandpaper priming Coat already on with No. 0. Glasspaper.

Stop with putty compased as follows:-

Linseed Oil Putty	1 part
White Lead in Oil	1 part

Stiffen with French Cholk if necessary.

1st Coat

Berry's White Enamel Primer - 2 parts

Berry's Luxbury White Enamel -1 part

Tinted to approved Pearl by adding Willeys.

2nd Coat

Berry's White Enamel Primer -1 part

Berry's Luxbury 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 port
Lionoil No. 2 2 parts

3rd Coat

Lionoil No. 2

GENERAL WORKING INSTRUCTIONS

All woodwork to be sonded 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 passible.

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 Coats with No. 0 Glasspaper.

NO. 2 BEDROOM

Treat as follows:-

1st Coat

Mission Lacklustre 1 port
Lionoil 1 part

2nd Coat

Shellac Solution

3rd Coot

Dull Gloss

BACK HALL

Treat as follaws:-

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

Shelloc Solution

3rd Coat

Dull Gloss

HARDWOOD DOOR SILLS

Stop immediately before staining with tinted Linseed oil Putty, and treat as follows:-

1st Coat

Lianoil 2 parts
Brown Flemish Lacklustre 1 part

2nd Coat

Liquid Granite A

3rd Coat

Liquid Granite A

NOTE

Please note that woadwork in all rooms except

- Front Hall
- Dining Roam
- Living Roam

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 roams off in the following order required by the proprietor.

- Dining Room
- Kitchen
- Pantry
- Day Nursery
- No. 1 Bedroam

Dudly C. Turner Residence

Specification for the residence of Dudly C. Turner, Esq., North Adelaide. F. Kenneth Milne, Architect. Dated July 1919.[1]

EXTERNAL WORK

Preparation. Sond off all loose scales and particles with fine glass poper 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

1 Public Records Office of South Australia, GRG 36/32/ 10, p. 10. G.S. Kingston's Specification Notes.

2 South Australian Architecture Archives, Milne, F. Kenneth Collection, Series No. 1 (Noteboak, 1906), p. 139.

3 South Australian Architecture Archives, Milne, F. Kenneth Collection, S.1, p. 118.

Lacklustre Woad Finishes

Treatment of Red Pine

Coots os applied. Lacklustre, shellac, and dull gloss finish.
Berry bros. Materials.

First coat and preparation: Sandpoper with No. 0 poper 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 thot con be stained the some day, or before the putty is dry.

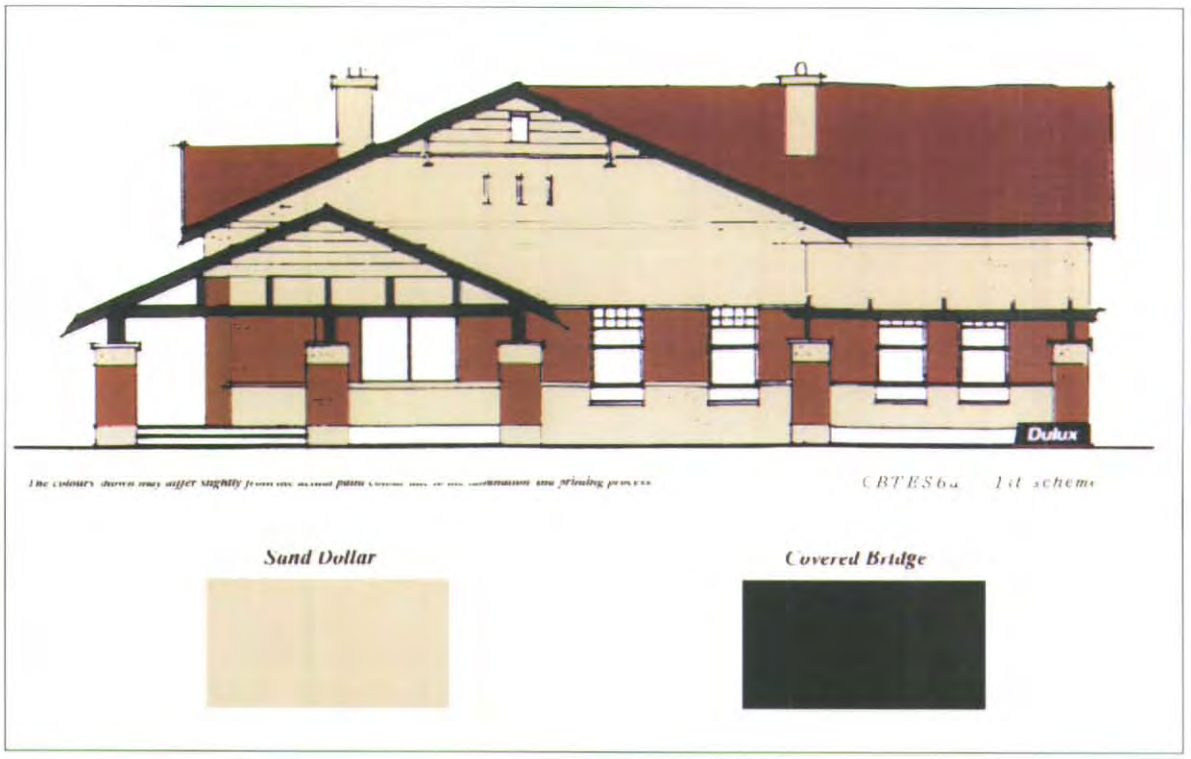
Then stain with lacklustre, the shade to be selected and reduce to the required shode with Lionoil, (which is the thinning property for all stains). Only stoin small portions at a time, and rub off immediately with clean rag (cheese cloth).

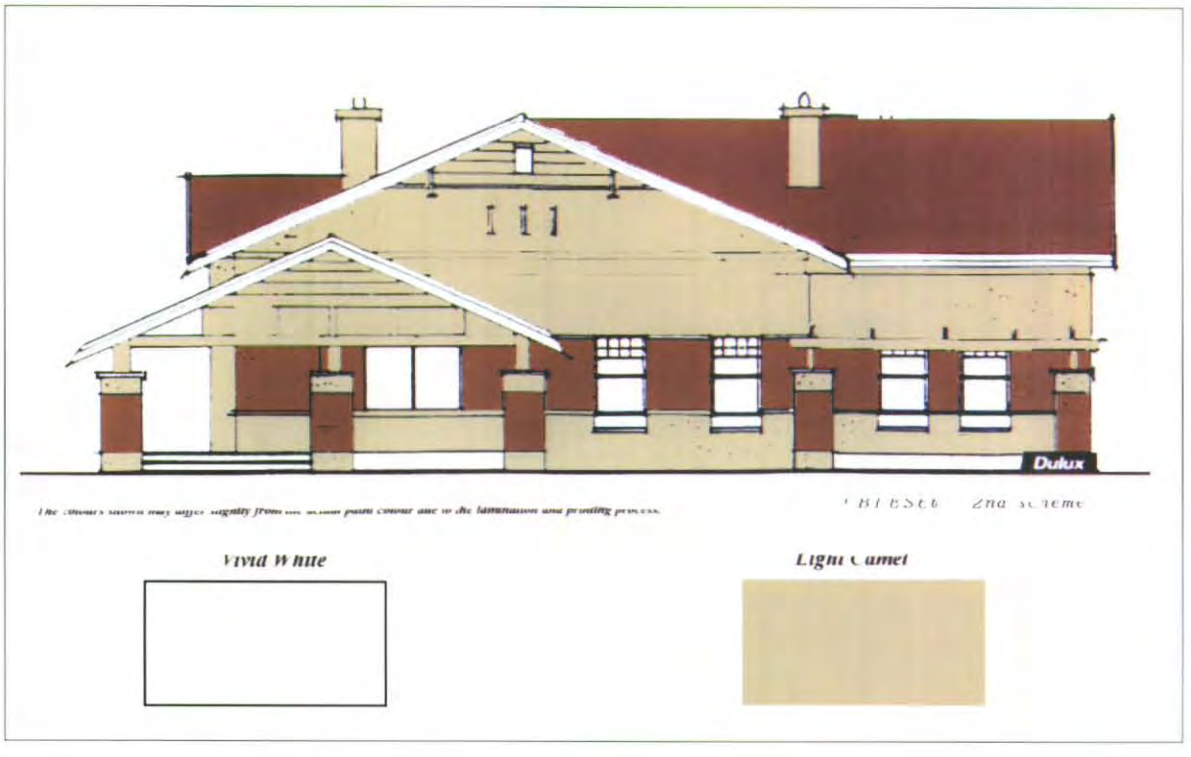
NOTE. The painter must be careful to judge for himself the difference in the noture of the timber, and where soft of dark timber is met with, the stain must be thinned weaker (using Lionoil).
After staining use Sondpaper again with the groin, this time bringing out all the high lights.

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 stroined through butter cloth first.

Final. Then sondpoper (No. 0) with the groin. Apply Berry Bros. Dull gloss finish full and evenly.
(From Kenneth Milne's Notebook)

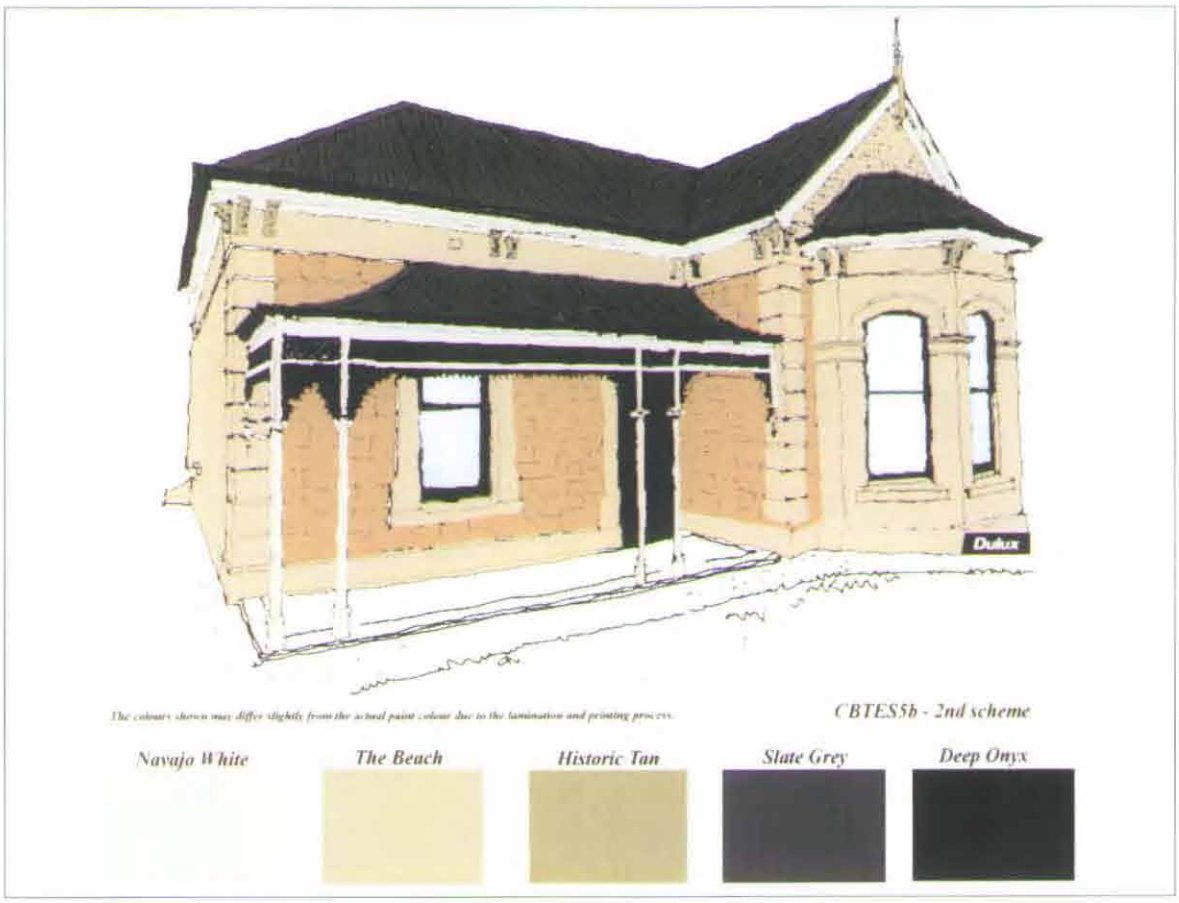
Computerised images indicating colour schemes

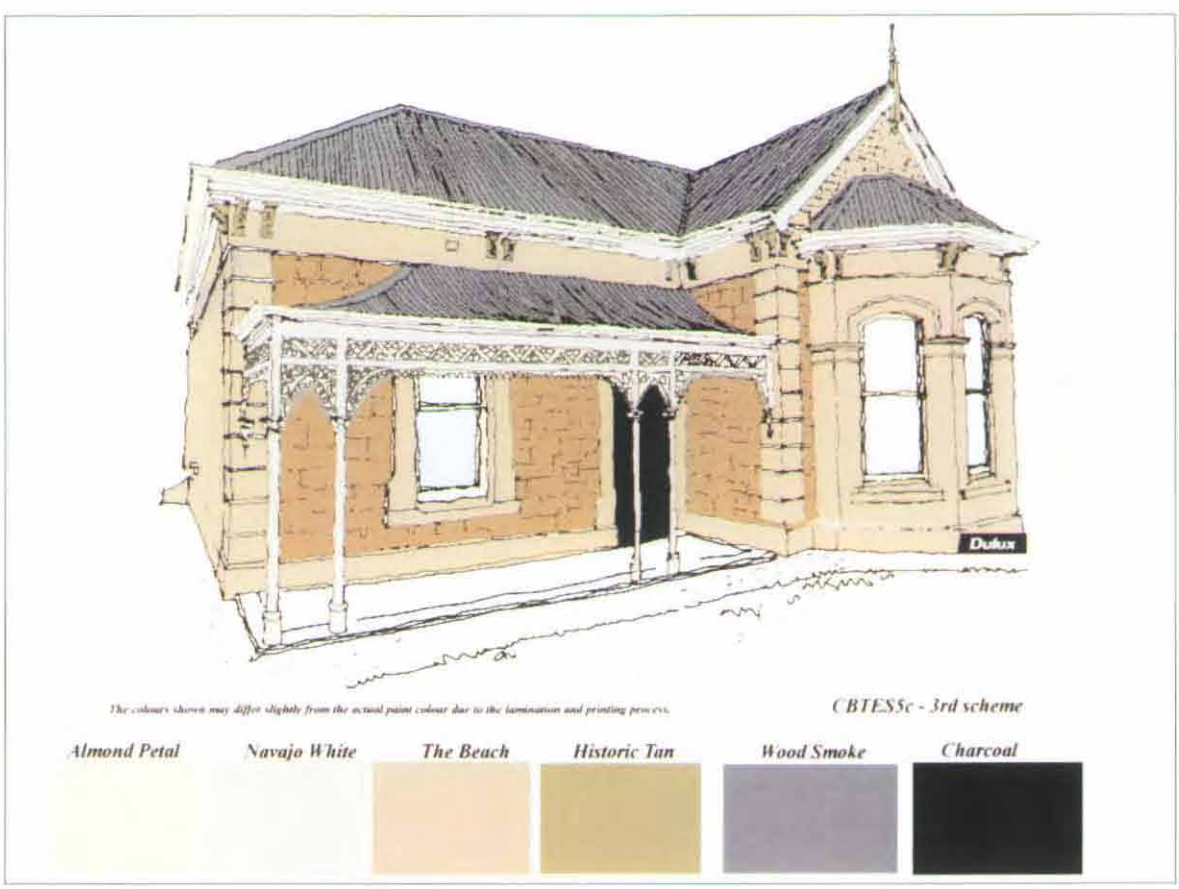




Courtesy: Dulux

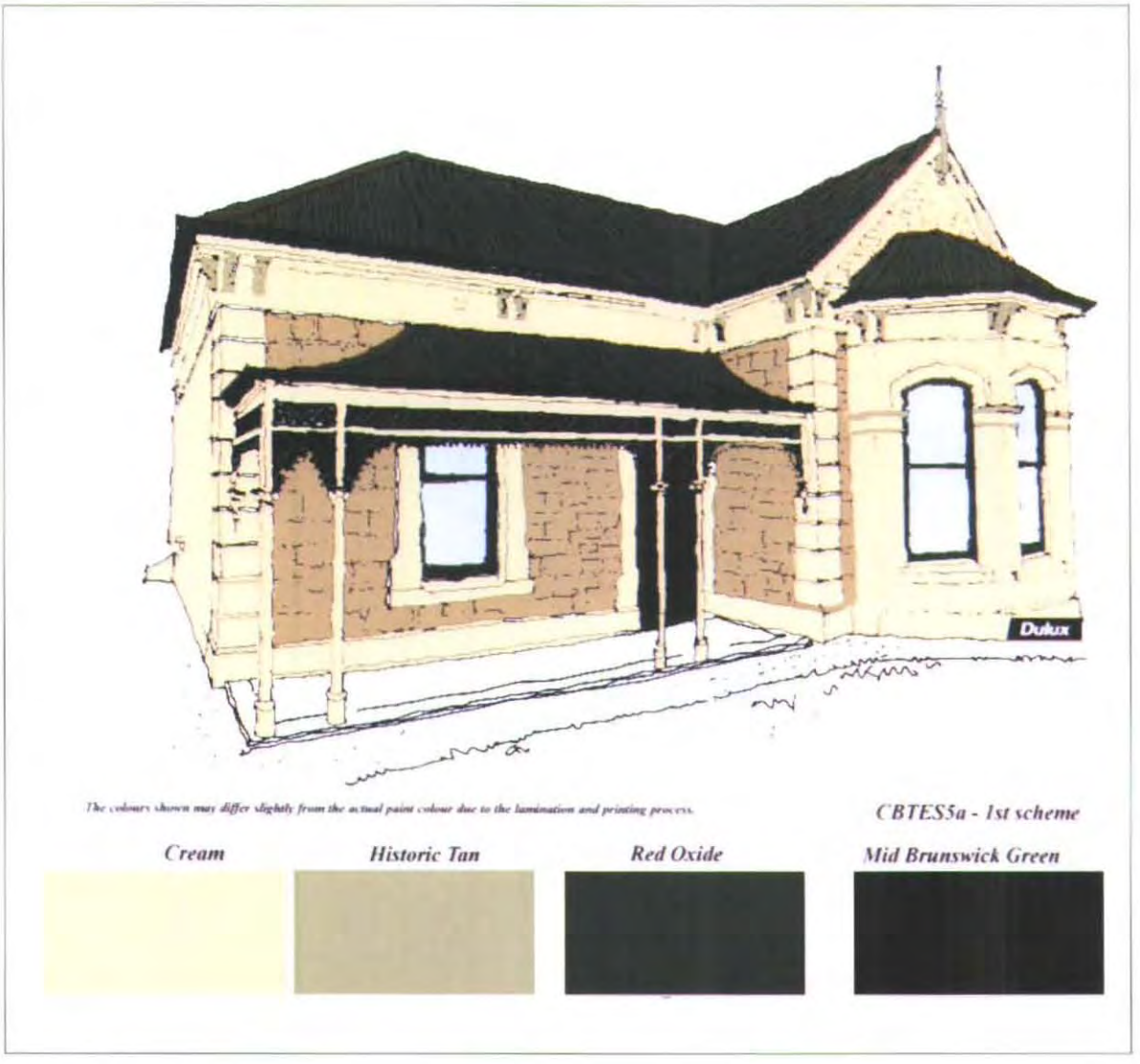
Colours represented may vary from actual paint colours





Courtesy: Dulux

Colours represented may vary from actual paint colours



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 clean 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 inclining to scarlet, or a bluish red tending to crimson; and so with the blue, greenish or purplish in tone. In practice it will be found that vermilion is unsuitable for crimson tones, ultramarine for green tones. (p. 124)

Old Paint Chart

Reproduction from a collection of old Paint Charts.

BORTHWICKS

AB

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.

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There is extra strength in every brushful.

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Undercoat Colour	
Cream	Ivory—261
Cream	Pale Cream—262
Cream	Cream—264
Cream or Stone	Light Stone—214
Stone	Mid Sienna Stone—216
Stone	Middle Stone—211
Stone	Portland Stone—212
Brown	Dark Stone—213
Brown	Tobacco Brown—243

"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 paint suitable for general use; quite a superior material to the low-grade stuff exhibited for the last twenty-five years or more in the windows of oilshops throughout the country. The Americans have taken very kindly to the introduction, and already the use of ready-made paint is common in the United States. But in England there has been a greater amount of conservatism to contend against, and although ready-made enamel paints are now the vogue, and but few painters 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 material. The arguments advanced against the use of ready-made paint have just as much force when used against enamel paint, but, curiously, users of the latter material rarely give them heed.

Paint to Suit Various Conditions

The practical painter bases his chief objection to ready-made paint on the argument that each batch of paint needs to be made to suit certain conditions, which means that the proportions of pigment, oil, turpentine, and driers will vary with circumstances. Of course, if paints of varying qualities are demanded, the manufacturer can easily supply; but it may fairly be asked whether the practice of varying the quality of paint is not followed too extensively. There are painters and painters, and while some men can be relied upon to mix up 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 to warrant their taking upon themselves such a task. The use of a standard paint for general application might be considered by some people as a positive advantage. However that may be, it may reasonably be assumed that a good grade of oil paint will answer a large number of requirements, and that in special cases some simple modification, or perhaps the mixing up of a special material, may be resorted to. Manufacturers will always give information as to the best means of thinning and otherwise modifying their materials, and therefore ready-made paint is not to be regarded as stuff over whose constituency the painter has no control; a word of caution is necessary here, though, because it rarely answers to tamper with a paint, a varnish, or an enamel at whose ingredients one can only guess. In cases where the manufacturer guarantees his paints to be made of such and such ingredients and those only, the experienced painter will, of course, use his own discretion with regard to their modification.

Mixing at the Job

The opponent of the ready-mixed material points out another disadvantage. He believes that all paints should be mixed in the room where they are to be used, and urges that the general use of ready-made paint would cramp him and, from an artistic standpoint, impose absurd limitations. This argument has weight, but it must be said that the mixing of tints on the job is far from being a universal system at the present time, and that in many cases the tints are mixed in the paint shop, which may be miles from the job. The objection has been met by at least one enterprising manufacturer, who puts up twenty different tints or colours and supplies with his materials a tint card showing proportions of white paint to be added to the standard colours to produce eighty further tints.

Fine Grinding and Even Suspension

Probably the greatest advantage claimed for ready-made paints is that the pigment contained is much more evenly and finely ground, and is much more intimately mixed with the vehicle. The old-fashioned painter did not appreciate that the evenness and the fineness of the pigment and an even suspension of the particles in the paint vehicle were essentials to the production of a durable paint film. These conditions are difficult to obtain except by grinding the ingredients together, a course which is out of the question in the generality of paint shops, where, as will be generally admitted, the methods of mixing paint are extremely elementary; the stirring together of the ingredients with a stick, or the rubbing of the paint through a sieve, are generally the most that is done, and these processes cannot compare in the point of efficiency with grinding. Only recently has the small paint mill made much headway. It must be confessed that in all ready-made paints the ingredients are not ground together; but it is safe to say that by whatever process they are produced, the mixing is sure to be more efficiently done than in the case of shop-made paint. It must be remembered that the demand for the ready-made material is not very large as yet, and that with the growth of the demand will come more perfected methods of production. Such, at any rate, has been the experience in the United States.

Stale Paint

Ready-made paint is likely to give trouble when it has been allowed to become stale, this being due to the fact that the oxygen of the air imprisoned in the package acts on the driers contained in the paint and produces fattiness. It would be possible for old paint to be systematically returned to the manufacturers to be re-ground and thinned; but the writer thinks that there should be some simple method available to prevent the oxidation in the sealed can, and believes that with the inevitably increased demand the trouble indicated will be overcome. Of course, there is at least one pigment, white-lead, which improves with age, but unfortunately the specific gravity of this pigment is so high that the particles tend to sink after a time, thus necessitating stirring before use. This should be a small matter, but buyers of ready-made paint naturally take it for granted that the material, whatever its age, is ready for use the moment the tin is opened, and they are rather liable to neglect so simple a precaution. There are ways and means of preventing the white-lead and similar heavy pigments sinking in the vehicle, but they can hardly be recommended. The incorporation of aqueous solutions of soft soap and alum is found to keep the heaviest liquid paint in condition; soap and alum solutions in conjunction form soap of aluminium, which has the advantage of being insoluble in water; but it is hardly likely that a paint faked in this way is any the more reliable for the treatment.

Testing Paint

It is not difficult to test the quality of ready-made paint, although an analysis is rendered difficult by the numerous cheapeners that are at the disposal of the manufacturer. For a practical and simple test, pour a quantity of the paint into a pound lever-lid tin, and put aside for a few hours or, preferably, for two days. The free oil on top should then be poured into a bottle, leaving the pulp as dry as possible. A little of the pulp may then be roasted in an old teaspoon over a bunsen burner or similar flame. The little beads of lead, compared with the quantity of charred ash, will give some idea of the relative purity of the pigment. But the manufacturer may claim that his paint is pure, although as much as one-third of foreign matter appears to be present; in such a case a white patent drier (always an adulterant) has been used freely, both because it is cheap and because consumers demand quick-drying materials.

A good paint always reveals its quality by its superior cohesive and covering capacity. Resistance to steam and acid can be tested by keeping a small painted slip of tin or iron for several hours over a vessel containing steaming water or fuming nitric acid, afterwards removing the paint carefully and looking for corrosion or rust marks. The oil that is taken from the top of the paint may be judged by the smell if the painter is an experienced man, and for drying quality by rubbing out on glass; and it may be compared with a mixture of known quality.

Other Advantages of Ready-made Paint

To the storekeeper and stocktaker in a big firm, ready-made paint will make a strong appeal for adoption because of the simplified bookkeeping, and because of the orderliness and cleanliness possible in the paint store and paint room. The collection of dirty pots and vessels, and the litter of sediments on the benches, are reduced to a minimum. The use of ready-mixed paints obviates a lot of work in the paint shop.

It is necessary to repeat an everyday warning: it is of the utmost importance to buy reliable brands produced by good makers, as the use of very cheap ready-made paint can only lead to disappointment and loss.

RECENT LITERATURE.—(*continued from p. 244*).

[illegible] The author, however, [illegible] bungalows for erection in Great Britain either as summer residences or as permanent homes, and he succeeds in giving a great deal of information which will be welcomed by those who have succumbed to the fascination of bungalow life and wish to build a house of this type for their own occupation. Some very useful chapters are devoted to the subjects of [illegible] choice of site, planning, external design, materials, sanitation, lighting, and cost. Mr. Harrison is happy in his choice of [illegible] and in his method of putting them together. His own practical experience as a bungalow [illegible] of no doubt as to the reliability of his statements. An extremely valuable feature of this book is the addition of plates showing typical designs of bungalows, some one or two of which we recognise as having already been illustrated in this journal.

"**Hints for Carpenters.**" Compiled and edited by **Albert Pair.** 141 pages, each [illegible] in., price 50 cents (2s. 1d.). New York: **Industrial Book Co.**, 178, Fulton Street.

Some hints on tools and materials are given in the first part of this little book, which we understand has been compiled from an American publication, and indeed gives every evidence of its origin. It is really a collection of very short articles of more or less interest to the amateur woodworker. Some of the articles are good, but many are quite out of place.

"**The Elements of Reinforced Concrete Building.**" By **G. A. T. Middleton, A.R.I.B.A.** 112 pages, each [illegible] in. by [illegible] in., 58 illustrations, chiefly in line, including one or two folding plates. [illegible] net. London: **Francis Griffiths**, 34, Maiden Lane, Strand, W.C.

We hold the opinion that the subject of reinforced concrete has been made needlessly complicated by the manner in which authors in general have treated it. So many of them seem to have proceeded on the assumption that the reader knows as much mathematics and graphic statics as they themselves do, and they introduce as many hieroglyphics into their works as they possibly can, with a result that is positively disheartening to the student. While we think that Mr. Middleton could have simplified several passages in his little book, we are yet pleased that he has provided an exception to the general style of authorship above noted. He has honestly striven to present a number of simple explanations which, after a little careful study, the inquirer will not have great difficulty in mastering. The treatise is intended as an introduction only, and therefore the reader is not taken into very intricate calculations, and arithmetic will answer his purpose all the way. The reader is assumed to be acquainted with the elementary principles of statics, and the author seeks to show that it is only the application which differs. The student will undoubtedly learn much from the chapters in this little work, which deal [illegible] with rectangular beams with supported ends, [illegible] reinforcements, T- and L-beams with [illegible] ends, continuous beams, beams with double reinforcement, floor slabs, [illegible] columns, walls and retaining walls, [illegible] and some patent systems.

A Great Story.—Have you read the opening chapters of a magnificent serial "The Missing Millionaire," commencing in the New Year's Number of the "Saturday Journal"? If you have not, be sure to get a copy, since it promises to be one of the finest and most startling pieces of fiction ever published in the journal, and, as every old reader of that paper knows, few editors can boast of being able to place such good material before their public.

"Queeries," the new competition, is still very popular, and this week no less than [illegible] is offered for [illegible] for one short sentence.

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. 741.

In concluding his remarks, Mr. Cruickshank-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. Screeton 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.

THE VALUE OF PIGMENT COLOURS COMMONLY USED IN DECORATION.

By D. S. Grieve.

Group 3—Lake Colors.

In the case of the yellows there is little or no need to find one, as the chromes and ochres furnish all that are required, so that all we find is a lime yellow of a pale lemon shade to use in distempers where lead chromes are not permitted, i.e., in sulphuretted hydrogen atmospheres.

Blue Lakes are not of much account as paint colors, as all shades may be obtained from Prussian and ultramarine blues.

Red Lakes are much more numerous, for we have vermilionettes, permanent reds, madder, scarlet, and crimson lakes, &c. The most permanent are undoubtedly those made from Helio R.L., struck either on blank fixe, barytes, or orange lead. The color is of vermilion shade, and when used with any white to give even pale flesh colors, it is found that even this pale shade will remain permanent for years.

Permanent Reds are also made from madder lakes with orange lead, but are inclined to deepen considerably in the course of time.

Vermilionettes 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.

Scarlet and Crimson Lakes are all more or less fugitive, and should be painted over a permanent red so that the change of color would not be so noticeable.

Para Reds or Bright Turkey Reds are gradually losing their place in the paint trade on account of their solubility in oil, known as "bleeding."

Rose Pink 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 varnish 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 a 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 ground work and outside work it is unrivalled.

White Zinc 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 conjunction 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 distemper color, and in silicate fireproof paints, it is very useful.

Timinox or Oxide of Antimony. This is one of the new pigments, being exploited in case of white lead abolition. 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 Titanium 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 time 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 zinc, which has greater hiding and spreading power than either, and is also a better protective for outside work; but the white zinc must not be more than 30 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 colour. It is ground and thinned in goldsize and turpentine, and the dried paint then varnished. It may also be used in conjunction with chromes and light greens, to give the richest bronze greens.

Vine Black or Blue Black is used as a distemper black, and when ground with barytes forms the basis of ordinary black paints. Its colour, however, is not intense enough, but that is enhanced by the addition of best gas carbon black.

Lamp Black is a poor colour 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 its own weight in oil to grind it, 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 coating tarpaulin covers, which is its largest use.

Gas 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 90 per cent barytes, 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 2.

We have now for consideration the chemical colors.

Ultramarine Blue and the lower grade of the same, lime blue, are prepared by fusing together in definite quantities (clay, soda, glauber salt, sulphur, carbon and silica).

Ultramarine blue is a favorite color with the signwriter and used in conjunction with aluminium is well in evidence on advertisements. It is used in distemper colors on account of being unaltered by lime, &c.

Prussian Blue or Chinese Blue, in the genuine qualities, and Brunswick and Celestial blue in the reduced qualities, are the same in composition and behaviour. In oil they are very permanent, but cannot be used as distemper colors, being, as they are, decomposed by lime and alkali. They may, however, be added to zinc or lead chromes in all proportions, to give green colours.

When used on ironwork, 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 patent drier should never be used with Prussian blue colors, as it reduces the blue to a lavender shade.

Chromates of Lead vary from the pale primrose to the deepest orange, and even to reds, viz: Persian red or American vermilion. All are very suitable for general painting, but if not well made will sometimes blacken considerably. They also blacken when exposed to sulphuretted hydrogen in the atmosphere, and are on that account not very suitable for outdoor work in towns, or as distemper colors. The Persian red or basic chromate 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 permanent 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 sulphide 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 chrome greens, which have already been mentioned with the chromes and blues.

Emerald Green is an extremely bright color, but is also fugitive and easily decomposed. 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 rusting. When properly applied with raw and boiled linseed 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 conditions. The quantity of oil should not be of more than four gallons of oil to one hundredweight of red lead. Red lead ready for use can now be obtained, but that simply means using a non or semi-drying oil in place of linseed, or by using red lead oxidized to its fullest capacity and linseed oil. Neither 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.

Vermilion or Sulphide of Mercury is not now much used as a paint color, because far more reliable results are obtainable from permanent reds. Vermilion is, however, still sometimes used for lining.

(To be continued.)

THE VALUE OF PIGMENT COLOURS COMMONLY USED IN DECORATION.

By D. S. Grieve.

Colours may be looked upon as divided into three groups:—

(1) **Earth Colors**, such as ochre, umber, red oxide, &c.
(2) **Chemical Colors**, such as chromes, blues, greens, &c.
(3) **Lake Colors**, including all pigments made by precipitation, such as vermilionettes and permanent reds.

Earth Colors. 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 70 per cent. silica, which is transparent.

Spanish Ochre. 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 Ochre or Sardinian Earth when 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 tinting power to a great extent determines its value, and with white lead should give from salmon 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 distemper colors, whilst when used as tints in oil colors they develop considerably.

Red Oxides are of two kinds, the natural pigments such as iron ore and the oxides obtained by roasting copperas (i.e., sulphate of iron). The percentage of Fe_2O_3 (ferric oxide) is not always an indication of the value of the oxides, either in the case of the natural or the manufactured product.

The brightest of all the natural oxides is the Persian Gulf red oxide, which has a ferric oxide content of approximately 60 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 95-98 per cent oxides made from waste liquors in the galvanising 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 copperas. None of the bright iron oxides, such as Venetian reds, red oxides, and Indian reds can be looked upon as preventing 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 colour, being only a very dark slate shade with no particular virtue.

Graphite or Plumbago is crystallised carbon, and is used as a paint color to some extent. Its chief properties are its enormous 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 colour, apart from that on account of its transparency.

We now come to the manufactured blacks—Bone black, vine black, lamp or vegetable black, gas carbon black.

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 light ness as the grey sample. Mount the chromatic samples in horizontal columns out from the corresponding grey sample.

Appendix 10.4 Recipes

Lime wash recipes

Gehrig, 1985, p. 59 lists the following as good recipes for exterior lime washes:

1. 35 lbs of rock lime: and
   9.5 gallons of sea water

2. 35 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. 35 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. 35 lbs of rock lime;
   7 lbs of zinc oxide;
   1lb 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 proctical ideas ond 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 tints, but a much more satisfactory chocolate paint, porticularly 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 gallons raw linseed oil
1 pint terebine (driers)
14 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 1oz. 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 sulphote 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 quontity needed varies considerably, but a trial with a board or two will soan 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.

Size

3oz of glue to 1 gollon of woter, Gehrig, 1985, p. 49.

Copol Vornish

A good oil copol vornish con be mode os follows. Toke 2 lbs of pole copol resin ond fuse. To this odd 1 pint of hot linseed oil ond reboil. Toke from the heot ond odd 0.25 gallan af wood turpentine.

A second method is to powder 1oz of copal resin. To this is odded 0.25 gollon of spirits of wine. Ploce in a jor ond shoke occosionolly until dissolved. Stroin before using. Gehrig, 1985, p. 43.

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OTHER PUBLICATIONS

INFORMATION LEAFLETS

These pravide up ta date infarmatian an legislatian, regulatians, available funding and criteria far entry in the State Heritage Register.

1.1 Definitians and guidelines

1.2 Guidelines ta approoches far canserving heritage places

1.3 Planning far canservatian management

1.4 Criteria far inclusian af places in the State Heritage Register

1.5 Summary af *Heritage Act 1993*

1.6 Summary af *Develapment Act 1993*

1.7 Entering a place in the State Heritage Register

1.8 Heritage Funding in Sauth Australia

1.9 Archaealagical sites and artefacts

1.10 Sauth Australian Architecture: a reading list

GUIDELINES

These booklets pravide informatian and pramate awareness an a wide range af design matters related ta heritage, ranging fram new develapment ta signage and fences.

2.1 Madel brief far the preparatian af canservatian plans

2.2 Advertising signs an heritage buildings in Sauth Australia

2.3 Fences in Sauth Australia

2.4 Alteratians and additians

2.5 Gardens in Sauth Australia 1840 - 1940

TECHNICAL NOTES

These booklets pravide mainly technical infarmatian ta assist in the maintenance and canservatian af ald buildings.

3.1 An awner's guide ta the maintenance af histaric buildings

3.2 Check it! The maintenance and housekeeping af histaric places

3.3 Early bricks and brickwark in South Australia

3.4 Remaval af paint fram masanry

3.5 Cleaning af masanry

3.6 Stane masonry in South Australia

3.7 Painting af alder buildings in Sauth Australia

3.8 Rising damp and salt attack