

THE RESTORATION OF INTERIOR WOODWORK

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Editors Note – The original presentation included some slides. These are no longer available for inclusion in this paper.

Faced with a tram body or railway carriage, the interior dark and dingy; varnish, black and crazed from years of pipe, cigar and cigarette smoke, where do you start?

To avoid any conflict with my fellow tramway enthusiasts if I talk about railway carriages and to avoid being rubbished by the railway enthusiasts who out number me here today, I will simply refer to a body, which can be either tramway or railway in origin.

Well, where do you start with the restoration of the interior woodwork of a body?

The first step, as far as I am concerned, is to dismantle and remove to a clean, dry and safe place, out of reach of any grease monkey, all panels, battens and other strips of wood that can be easily removed. “Ah”, I here you all say, “that sounds pretty easy, now lets get stuck into the real work. - But the real work is just beginning.

Do not forget that the body will have to be reassembled at some time in the future and more than likely it will be some two to three years later and possibly by someone different. It is, therefore very important that all parts are clearly and precisely labelled. The essential features to any label are, firstly, the part description and, secondly, where it goes. The part description is relatively easy, every knows what a window is, a door, a door arch, scotia etc. Some parts may be a bit more obscure, such as the various window battens, and in these instances a simple diagram to be filed in a safe place is very helpful.

The exact location of a body part can, however, be somewhat more tricky to describe, particularly when you have a multitude of identical or near identical parts, for example, windows, window battens, scotias. In fact, virtually every part you can think of will be duplicated somewhere and because “identical” parts are not identical, that is they will only fit in one position, the exact location of the part must be recorded. In recording their position, always ensure the part is described relative to the body itself and not relative to its outside environment. I have seen parts labelled “Zip End” because there was a Zip water heater at that end of the workshop, while parts from the other end were labelled “Door End” because the main workshop doors were at that end. But what would have happened if, as so often happens in our type of organisations, the body was reassembled in a different place or the workshop environment was physically altered.

Fortunately, for those of us in the tramway business the tramway promoters and builders used what appears to be an almost standard numbering system. Firstly, it was necessary, of course, to differentiate between two identical ends. This was achieved by labelling the ends simply “1” and “2”, or “A” and “B” depending on the system, and in the case of electric trains fitted with air brakes the number 1 or “A” end was always labelled in such a way so that the air compressor was on your right hand side when facing that end. If any one knows what happens in the case of a railway carriage or a tram that was not fitted with air brakes, I would be pleased to hear from them. [Editors Note:- In NZ railway practice No 1 end is the handbrake end (2 end is opposite), A side is the handbrake side (B side opposite).]

The second side of the numbering system was to consecutively number all identical parts in a clockwise direction with the number 1 part being the first one to the right of the centre line at the number “1” (“A”) end. Naturally, the highest numbered part of a series of identical parts is the part immediately to the left of the centre line of the number “1” (“A”) end.

However, world politics being what they are, it is difficult to achieve a world standard. MOTAT’s No 11 built by Brush of England, while still using the no. 1 end as the reference end, used an anti-clockwise direction — perhaps it has something to do with the way water swirls down plug holes in the two hemispheres! So check what system was used on the body on which you are working before starting, by removing a few window battens and checking the numbers stamped on the reverse side.

I know that some museums have developed their own system for labelling parts, but I believe that we should all attempt to use the original labelling system for the body being worked on. This is for two reasons, firstly you do not end up with two sets of numbers or letters stamped on various parts leading to confusion at a later date, and secondly, members moving from one museum to another do not have to learn an entirely new labelling system.

The labelling system, should of course be supplemented by a register detailing part descriptions, locations (with diagrams, if necessary), screw types and dimensions and the number of identical parts in a series.

Now, with the preliminaries over, lets get into some real restoration.

The restoration of interior can be broken down into five distinct steps and I shall deal with each in order.

- (i) Stripping off Paint and Varnish
- (ii) Bleaching
- (iii) Grain Filling
- (iv) Repair of Damaged Areas and Minor Imperfections
- (v) Varnishing.

(i) Stripping off Paint and Varnish:

Before any item can be revarnished, it is almost always necessary to completely remove the old finish. This is usually due to one of two reasons — either the old varnish finish has crazed, that is it has cracked, bubbled and peeled; or as so happened in the latter years of a body’s service, the promoters committed the ultimate sacrilege, by painting over a beautiful varnish finish.

There are two basic methods of removing old paint and varnish, either by using chemical strippers or by scraping. I do not personally favour the latter, because if you are not skilled in the use of a scraper, you could end up doing serious damage to the wood. Therefore, for museum type environments I recommend the use of chemical strippers.

Chemical Strippers fall into three basic categories:

- (1) Those using organic solvents, which may be washed off with water,
- (2) Those using organic solvents, which require final cleaning with organic solvents, and
- (3) Water soluble caustic powders.

The strippers falling into category 1, organic solvents which clean up in water, are generally the easiest to use, although perhaps the more expensive of the three categories. I do not propose to cover “how to use strippers” because this should be rather basic to all of you, however you should be aware that there are two subcategories of the first group:

- (a) those based on the solvent methylene chloride, and
- (b) those based on phenol.

My warning to you all is not to use any phenol based stripper — it has the tendency to give certain timbers, notably Kauri, a pinkish hue!

The main thing to be aware of when stripping paint and varnish off any part of a body, whether it be interior or exterior, is to carefully note what you see. The various coloured paint layers, the various varnish layers, sign writing etc. These are all part of a vehicles history and may provide important information about the period the vehicle is being restored to. One clue to watch for closely when stripping open grained timbers such as oak, maples, mahoganies etc. is grain filler.

A handy hint when stripping these open grained timbers, use a wire brush, lightly in the direction of the grain to remove paint and varnish that becomes clogged in the grain. The wire brush should be clean and in good condition. Keep it in a safe place away from those grease monkeys that lurk around your museum.

(ii) Bleaching:

During the stripping process we have just examined, the timber will darken with a grey-black stain. These grey-black stains will also be apparent on timber where the old varnish finish has deteriorated to such an extent that the surface of the timber is bare in places. This dark discolouration is due to moisture dissolving natural chemicals in the wood and depositing them on the surface as the wood dries out.

These stains are best removed by using a saturated solution of oxalic acid which is a very mild bleach. Oxalic acid bleach is extremely simple to use — just brush it on and watch the stains disappear before your eyes — but normal precautions for toxic chemicals should be followed. Skin and eye protection is important.

After bleaching, the excess acid should be washed off with plenty of water and the timber stood up to dry. During the drying process, turn the wood end for end from time to time so that drying is even. Do not stack several wet pieces together or lie them flat — stains will develop again.

Sometimes it is necessary to bleach the colour of the timber itself. This may be the case where a particular timber may have a range of shades depending on the part of the tree it came from and it is desired to give a more uniform colour to the various panels. Alternatively, new or replacement panels made of a different timber to the original because of the non-availability of the original, may need to be bleached to match the original. This is best achieved by alkaline peroxide solutions.

In my time at the Western Springs Tramway in Auckland, we developed a whole range of these types of bleaches for use in different circumstances. They have come to be known by the generic term “super bleach”, a term which I think speaks for itself.

One specific application of this sort of bleach is the restoration of Kauri. Kauri darkens slightly with age and with the use of oxalic acid, so after bleaching with oxalic acid to remove water type stains; a mild alkaline peroxide bleach of ammonia and hydrogen peroxide can be used to lighten the timber. The peroxide being neutralised with acetic acid.

For spot bleaching of small areas, sodium hypochlorite — which is your common household bleach, Janola, White Magic etc. — is very effective.

(iii) Grain Filling:

I mentioned before that you should be careful to watch for signs of grain filler when stripping varnish from open grained timbers. After washing off each application of stripper look closely at the grain while the timber is still wet. If the timber has been grainfilled, the grain will appear white rather than dark brown.

It was quite common practice, particularly prior to the 1930's, to fill the grain of open grained timbers with a plaster of paris mix. Because the filled grain has an off white colour as against the normal dark brown colour, grain filling had the effect of removing the visual impact of the grain and producing a panel of very even colour.

The paint manufacturers, Wattyl produce a premixed grainfiller in a range of colours which is easy to use and which gives excellent results. The blonde colour grainfiller is an excellent match to the original plaster of paris mix.

(iv) Repair of Damaged Areas and Minor Imperfections:

During a tram's or railway carriage's lifetime, its woodwork is bound to suffer damage in the form of scratches and other indentations. The odd unwanted screw and nail holes are also present where advertisements and other notices were attached.

I find that it does not pay to worry about small nicks and scratches. After varnishing and reassembly of panels, such small blemishes disappear in the splendour of the completed job and six months later you will have forgotten all about them and will need to search for hours to find them.

Where it is necessary to fill old screw and nail holes, I prefer to use linseed oil putty coloured with an appropriate dry powder stain. With this system it is possible to obtain a very close colour match with the timber whereas colour matches with proprietary wood fillers are more difficult to achieve particularly as different lighting conditions can affect the colour of the fillers. However, whatever fillers you use, be sure to use them after the sealer coat of varnish has been applied otherwise the oils and solvents in the filler may stain the surrounding unsealed timber.

Major damage is more difficult to deal with and requires greater skills. An example of what I consider major damage is when, due to advertisements, there are half a dozen screw holes in an area no bigger than a postage stamp. These relatively large and unsightly patches may be repaired by inlaying pieces of matching timber. As mentioned before this is a skilled job and should not be attempted on the real thing by the inexperienced. It is important that the inlay timber matches the rest of the panel not only in the type and colour of timber but also in the grain. The direction of the grain must be matched in all three dimensions in timbers where the grain is a feature.

(v) Varnishing:

I do not intend to say too much about varnishing because it is a straight forward job suffice to say

- use good clean brushes,
- use a tack rag to remove dust
- varnish in a dry, clean, dust free area. After spending a lot of time and effort preparing the panels do not ruin the job at this stage by rushing it.

However, just one tip. To improve the depth of timber colour and to provide a key for successive coats of varnish, the first coat should be a satin finish thinned 10% with turps.

Unfortunately, the restoration of interior woodwork is not without its problems and I would like to look at a couple of them.

1. Rust Stains:

Rust stains arise from steel nails, panel pins and screws which rust over time and must be the major problem in interior woodwork restoration. Generally speaking steel fasteners were never used by the original builders of a body except for window beadings holding the window glass in place; brass woodscrews being the preferred fastener. The use of steel nails and screws crept in in more recent years for affixing advertisements and for effecting quick repairs.

Let's have a look at some typical rust stains (show slide). [Graphics not available – Editor]

They are generally grey/brown in colour and can become quite large around steel nails and screws. Oxalic acid will remove these stains easily but they reappear some six months later, by which time varnishing is usually finished.

Although I am unaware of any specific research being done on the causes of these mysterious reappearing stains we can theorise about the reasons. Iron can exist in two ionic states, one being the ferrous ion and the other the ferric ion. Rust is the common name for ferric oxide, which by its name contains the ferric ion.

Ferrous compounds are very pale green in colour and in small concentrations, almost colourless, while ferric compounds have that classic rust colour. The action of oxalic acid on the ferric ions in rust reduces them to ferrous ions thus bleaching the stain. However, ferrous ions are not very stable and over time, in contact with oxygen, revert to the ferric state. Hey presto, your stain has reappeared.

I know of no way of chemically removing rust stains although their impact can be greatly reduced by carefully removing all traces of rust from the timber. It is important that all old steel nails screws etc. are removed from the panel and any traces of rust left in the hole are reamed out using a twist drill of a diameter slightly greater than the nail or screw hole. This next slide illustrates the big improvement that this treatment makes.

Another way to, perhaps, overcome the problem is to cut off the supply of oxygen to the timber after bleaching. I am currently hopeful that by using an epoxy timber sealer and preserver as the first varnish coat a satisfactory solution may be at hand. In any case I will probably always resort to removing all traces of rust beforehand.

2. Light Induced Staining:

I have noticed at times, where the timber has been unprotected for a number of years stains can develop after varnishing apparently on exposure to light. This is particularly common on seats where backs and backsides have worn the varnish away and although the timber responds well to bleaching, grey stains reappear after varnishing. In the following slide such stains are clearly visible and developed sometime after the seats were reinstalled, having being kept in dark storage for some two years after re—varnishing while the rest of the tram was restored.

At this stage I cannot offer an explanation or a solution. If any one has the answer perhaps they could let us know.

Now to finish off on a lighter note. I have referred, a number of times, to a species of animal known as the “grease monkey”. You will not find any reference to this animal in any encyclopedia of the animal world so I will attempt to give you a brief description.

The grease monkey is a descendent of homo sapiens and loves to play around with dirty greasy objects. In fact he loves grease so much that he uses it as camouflage, give him a pair of new overalls and Persil has no show of keeping them white. His favourite haunts are steam locomotives and if one of these is not around, a bogie of some sort will do. This species has but one natural enemy — the woodwork restorer, due entirely to the grease monkey's unintentional habits of leaving greasy objects on the woodwork bench or picking up your nice clean piece of timber with his greasy fingers.

So good luck with your interior restoration but beware of the grease monkey!

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ADDENDUM TO “THE RESTORATION OF INTERIOR WOODWORK”

SANDING.

Following the conference a couple of delegates mentioned that I had not mentioned sanding in the paper and as this is important to the finished job I have compiled some brief notes.

- always sand with the grain.
- use a flat sanding block whenever sanding flat surfaces.
- keep square edges square i.e. keep the sanding block flat on the surface.
- sand before bleaching and lightly sand after bleaching before varnishing and between each coat of varnish.
- if you have had to bleach the colour of the timber be careful not to sand too heavily afterwards and so lose the benefit of the bleach.
- belt sanders are very useful on long flat pieces while orbital sanders can be useful on large flat areas.
- if using an orbital sander be sure to sand the “circles” out by hand.
- **NEVER** use a disk sander.
- sand paper of around 240 grit is ideal for varnish work. I personally prefer to use dry lube silicon carbide paper (grey colour).
- sand paper down to 150 grit can be used where a heavy initial sanding is required or to remove runs in varnish.

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