TRAM AND RAILWAY CARRIAGE ROOF COVERINGS

Chaired by Les Stewart, Wellington Tramway Museum

Tram and railway carriage roofs were traditionally covered with canvas stretched over the roof and sealed with a heavy linseed oil based paint. However, over time with exposure to sunlight and the weather the canvas and paint has a tendency to crack and allow rain water to leak through the roof. Other materials are now available which have advantages over canvas and the workshop examined two alternatives - butyl rubber and fibre glass.

Butyl Rubber

Bruce Gamble from MOTAT spoke about their experience in re-roofing Fiducia 257 with butyl rubber and showed a video of the actual re-roofing.

Butyl rubber is marketed under several different trade names including Butynol and Butylclad. Useful information on materials and application methods can be obtained from Skellerup Industries.

Benefits of Butyl rubber include:

1. Longevity
2. Good resistance to ultraviolet light and ozone
3. Impervious to water
4. Unaffected by normal ambient temperature levels
5. Easily moulded around compound curves and retains its flexibility
6. Can be painted with water-based acrylic coatings

Butyl rubber comes in rolled sheet of various colours (greys, tans, black) and thicknesses (0.75, 1.0, 1.5, 2.0mm) and in a normal width of 1500mm. It is widely used in building construction as a roofing membrane, laid directly over plywood or concrete decking with a contact adhesive. There are numerous commercial installers, although installation is well within the capabilities of most skilled tram and railway restorers who have watched the process.

On Fiducia 257, two lengths of mid-grey, 1.5mm butyl rubber were laid with a 70mm lap down the centre-line of the roof. A special lap tape was used to ensure the roof was completely weather tight. The roof on this tram is a

mixture of plywood, curved sheet metal and wooden battens. Good adhesion was ensured by giving all areas a priming coat of diluted contact adhesive well before the final stage. No problems were found where it was necessary to stretch the sheet slightly at the tight compound curves over the cabs. The final appearance is indistinguishable from canvas.

Laying butyl rubber on the roof of Fiducia 257 at MOTAT. *Photograph: Ian Stewart.*

It is intended to keep the roof painted with acrylic roof paint. If this is maintained, the normal guaranteed life of 25 years should be extended indefinitely.

The cost for 257 was $1,100 which included supply of the material and installation which took 2.5 hours. The cost compares favourably with canvas which costs approximately the same.

In answer to questions:

- Butyl rubber can easily be repaired by applying contact adhesive to the patch and the area to be patched.
- As with any organic material, fire-resistance is not high. It is no worse than painted canvas.
- Application over timber treated with CCA preservatives may require a

barrier coat to prevent the residual oily solvents in the wood from softening and degrading the butyl rubber.

Bruce showed a video of the tradesmen laying the butyl rubber on tram 257's roof. Any enquiries regarding copies of this video should be made to the Tramway section of MOTAT.

Fibreglass

Arthur Rockliff of The Otago Excursion Train Trust spoke on their experience of using fibre glass for re-roofing their rolling stock. The first one was completed approximately 12 years ago and it has caused no problems since.

One advantage fibre glass has over butyl rubber is its rigidity. Because of its composition it stiffens up the whole carriage and assists in the carriage's stability.

Before application all old canvas and other old coverings should be removed, all holes in the wood patched, protruding nails removed or punched under the surface and the whole roof surface smoothed off.

A standard fibre glass mat is laid over the roof first and then the epoxy resin mixture is spread over the mat. It takes about 20 minutes to harden at a temperature of 15^{o}C. Once the fibre glass has fully cured a coat of acrylic paint can be applied to assist in preventing deterioration from ultra violet light.

Holes for roof mounted items such as ventilators are stuffed with newspaper before fibre glassing. Once cured, the fibre glass covering the hole can be cut out, the newspaper removed an the ventilators reinstated.

Current costs are unknown but fibre glass is probably dearer than butyl rubber.

There is a possibility that stress fractures could occur if the fibre glass forms too hard a shell and prevents flexibility of the car frame.