



## **CHOICES FOR SLEEPERS AND TREATMENTS**

This paper is a follow on from the track and fittings session at the 2000 Federation Conference in Palmerston North. It is intended to outline the main points of the session in regards to options for sleepers and their treatment.

Because of changing availability of traditional types of sleeper here in NZ it is time to look at just what is available for use and suitability to our needs. In the past it has been the norm for probably most Groups to use second hand hardwood and pine sleepers from NZR/Tranz Rail, but this situation is now changing for several reasons.

1. Hardwood sleepers still in use are now generally so old that when they do become available they are not suitable for putting back into track and will fail within a short time. They really only have use for firewood and gardens.
2. It is now more than ten years since the last pine sleepers were creosote treated and those pines which may be able to be purchased today can be in the region of 40 years old and also at the end of their useful life. Any purchase therefore needs to be done with care looking for signs of rot or failure. Creosote treatment has been a great success but it does not last forever.

So what are the options for Groups to use in building or repairing their track ?.

### **HARDWOOD**

As pointed out above most hardwoods that are available can now be anything up to 80 years old and long past their use by date. If they have been buried in the ground then some of the species will rot fairly quickly when exposed to the air and they dry out. There will always be the exception of course and timber off bridges for instance is in generally better condition because it has never been in the ground. However this type of timber is generally also hard to get and most second hand hardwoods would today be material out of yards. In addition, if a sleeper has already been drilled twice then it is generally of little use as it will be structurally unsound in the area of the bolt holes.

Hardwood sleepers are being brought into the country in large numbers from Australia by garden centres for use in home gardens. Their retail price is quite high - anything up to \$30 each and the quality needs to be looked at, but this is a possible source for the odd replacement. Check the length because depending on which State they came from they could be 7', 8' or longer. They are an expensive fix at that price however and again their life expectancy is unknown.

New hardwood sleepers could always be an option of course and it is known that Tranz Rail is now looking at hardwoods again because creosoted pine is no longer available. This would be a brave move for most Groups however as the need to purchase in bulk to get a good price, coupled with transport costs could see some quite expensive timber. It is also known that even within Australia there are concerns about timber quality and life expectancy. It is a world problem it seems.

## **RADIATA PINE**

Creosote treated pine has been and continues to be an-excellent product for sleeper use. It has been around since the 1950's at least and just lasts and lasts and that is the problem. When pine finally fails it is because it starts to rot, generally from the inside and it is no longer any good for anything, but up till that time there is generally no good reason to replace it. Pines which do come out of the main lines often do so because track upgrading sees them replaced by concrete and find a ready use elsewhere on the Tranz Rail system. When pines are offered for sale they have no further use within Tranz Rail and may need to be thoroughly checked before purchase as they may be either suffering from old age or the treatment may have leached out and the timber could be exposed to rot. This does not mean for a moment that you would not find sleepers suitable for your needs from this source but be aware that even the pines are starting to suffer from old age and could be up to 40 years old already.

Creosote treatment of pine in NZ has not been done for 10 years or more now largely as a result of the Resource Management Act and OSH requirements. It is not illegal to process timber in this way but it would be hugely expensive to set up a new plant to meet requirements. There are still a number of plants in Australia which do creosote treatment but none of them do pine railway sleepers. This appears to be a Kiwi thing and in the cold hard light of day there is only one customer in NZ and that of course is Tranz Rail.

So can new pine be used for railway sleepers if it can't be creosote treated?. Experience shows that yes it can and that properly treated and handled you can expect many years of life from pine treated to ground retention standards. The salient points for you to consider are set out below.

1. The grade of timber you use can have an effect on the absorption of treatment and hence the life of the sleeper. First grade timber is by nature largely free of knots etc., and for this reason treatment is able to fully penetrate the timber.

Second grade timber from trees that do not meet the first grade standard may have more areas of knotting and gum which the treatment cannot penetrate and this over time could become the source of rot from fungus etc. This however is only usually relative to the expected life of first grade timber and in many cases timber of this grade could give you a quite satisfactory life in the track if installed properly.

Farm forestry pine cut from shelter belts and big old man pines are generally so full of knots and gum that they do not take treatment very well at all and you cannot expect to get much of a life from these at all.

In the end it may come down to a toss up between the cost of a particular grade of timber as against life expectancy and that is a judgement that each individual Group would have to make.

The age and size of the trees from which the timber is cut can be of importance to the life of the final product. In days gone past sleepers were cut from logs which were a good 30 years old and of a diameter which allowed four sleepers to be got from the round. This meant that the corner of each sleeper showed the heart of the log which is the hardest for treatment to penetrate and most of the sleeper was the sap wood. This then meant maximum treatment penetration.

Today, logs of that size and age have long since disappeared to Japan and elsewhere and the age of the trees is more like a maximum of 20 years and even younger and often only one or two sleepers can be cut from the girth. It is important therefore that timber as mature as possible is used. Often now timber of the size we want is cut from the centre of the log (COL) and with the heart of the tree at the centre of the sleeper treatment penetration is crucial. Immature and small trees can also be soft and give difficulty in holding spikes

2. Before treating timber it is important that it is as dry as possible and you should talk to your sawmiller and treatment plant about this. If your mill will cut your timber and allow it to air dry for 4 months or more then this is ideal. The timber will also importantly toughen up and hold fastenings better especially if the tree is a bit young.

The treatment for pine has been around for years now and is generally referred to as C.C.A meaning Copper, Chrome, Arsenic and is applied in different levels of strength under pressure. The original process used CCA salts and this while very effective for the timber was known to be very destructive of any metal fittings especially if the timber was still slightly wet and the treatment still "working" when the timber was installed.

Today the treatment used is CCA OXIDE, which has been shown in trials in America to be up to 60% less destructive to metal than the old process.

The treatment recommended today for pine sleepers therefore is CCA OXIDE to the level of H5 for ground retention. Please note that some of the treatment plants may still be using the old CCA SALT treatment and others may not treat to H5 standard. It is important for the life of the sleeper and your fittings that you specify CCA OXIDE and H5 when buying.

3. When your treated sleepers arrive on site it will no doubt be very tempting to use them straight away. Experience has shown that this is the very WORST thing that you can do. When they arrive from treatment they are still quite wet and the chemical process is still working inside the timber and until the reaction stops and the timber is quite dry then you can expect trouble if you drill them and put metal fittings like screw spikes into the timber. Stack the sleepers to dry for three months or longer if possible until they are thoroughly dry. Experience has shown that if this is done then there should be little trouble with spikes. There appears to be little if any benefit to be gained from greasing or oiling screw spikes as the lubricant tends to be wiped off as the screw enters the hole in the timber.

## **STEEL SLEEPERS**

Steel sleepers have been used in Australia and elsewhere for some years and have a good life and are relatively easy to handle. There are only a couple of tunnel sites where they are used in NZ however and as such are not available here second hand. They are certainly used in 3'6" applications in Australia and BHP steel are the producers if anyone wants to take this any further. There are tricks to learn in laying them and the cost of fittings also has to be taken into account. They are of course designed to be used in conjunction with new or un-worn rail and the matter of gauge with worn rail would need to be watched.

## **CONCRETE SLEEPERS**

The message here to anyone who thinks they might like to lay in concrete is "good luck" to you. At least one Group has used them in limited quantities and on the surface they would appear to be ideal. In reality they are expensive to make and the cost of the fittings has to be added in and like the steel sleepers are made for rail with a good profile and are difficult (but not impossible) to re-gauge. Perhaps their biggest drawback for our use is their bulk and weight. They cannot be lifted by hand and two men will struggle even to roll them on their sides. Their installation and removal is very definitely a fully mechanised job and this would be beyond most Groups at this time.

## **PLASTIC SLEEPERS**

Some Groups will recall that these gave promise when some experimental sleepers were produced about seven years ago. There are still a couple on test at Tranz Rail at Westfield and the GVR has one also. None show any sign of deterioration or failure but no more have been produced by the manufacturer for a combination of reasons. However the firm who developed the product and has the patent is about to have another look at the market and if things change then we will keep you informed.

## **OTHER TIMBERS**

From time to time there have been suggestions from some Groups that they might like to try timbers such as blue gum or macrocarpa for sleepers often because they might be able to get it free. Well the choice is yours but neither of these timbers are suitable for ground retention and only a short life can be expected from material such as this and of course they do not take treatment because of all the gum and resin in the timber.

## **CONCLUSION**

There are a number of different ways that Member Groups can go when choosing sleepers and it really all comes down to what is most suited to your needs and to your budget. The information above will go some way to helping you to make that choice.

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