

How to Build a Pergola That Won't Rot

The Brief

Replace an existing rot damaged pergola with an identical timber structure except for one important difference – it must not rot. The existing Pergola was only ten years old and had been designed by the original architects of the 98 apartment complex at 108 Greville Street known as “Leggetts Apartments”. It was constructed entirely out of very large section Oregon timber and served as an ornamental walkway into the large courtyard area.



Why did it rot so badly in just ten years? Two main reasons:

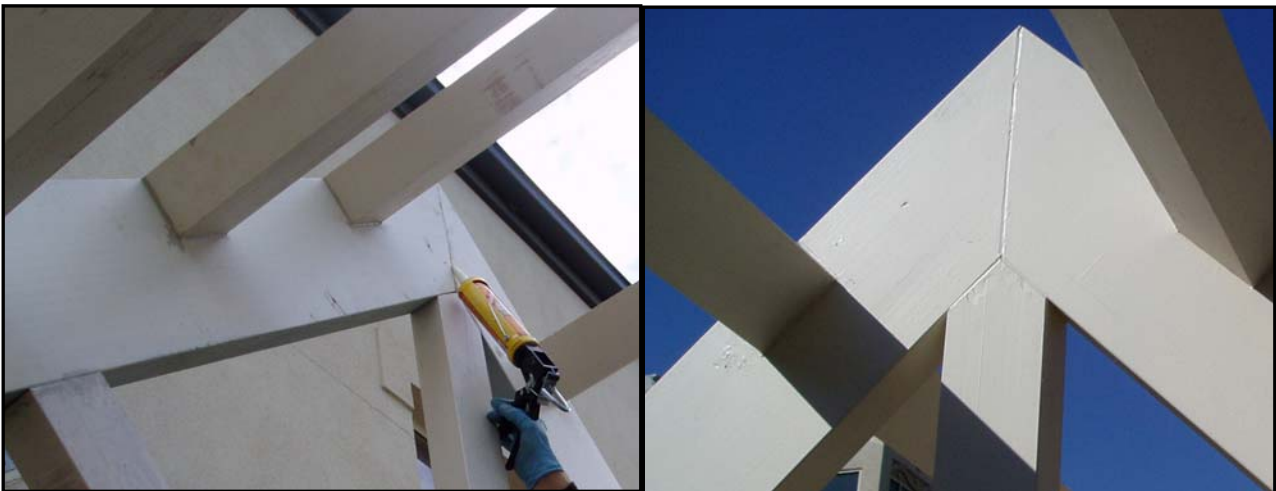
1. The design of the pergola included numerous timber joints and concrete-to-timber junctions that allowed water to be trapped and absorbed into the timber, particularly end grain timber.
2. Today's “plantation grown” Oregon is an excellent structural timber but is not very rot resistant.

Our brief was to keep to the same design because to change the design would require architects and body corporate decisions (getting 98 owners to agree on a new design could be a lengthy process – in the meantime the structure is literally disintegrating and unsafe to walk under). So our specifications included treating all vulnerable timbers with Multi-Primer before painting. Not only would this achieve permanent protection against rot, but would also stabilize the timbers, minimizing warping and splitting and maximizing paint adhesion and longevity.

Carpentry Details

We began by doing all the cutting to length, plumb cuts and cutting of joints. We even pre drilled the bolt holes where possible. The reason for doing all the cutting (where possible) before beginning construction was to enable us to do all the Multi-Priming in one hit.

We also ran a small bevel or arris (about 3mm) along all edges of joints so that after assembly a small “V” groove is created that can then be caulked with Sikaflex marine grade paintable caulking.



Multi-Primer Treatment

Alan proposed LOSP treated laminated timber for the roof trusses and the long beams supported by the posts as this timber is exceptionally stable and comes already rot-proofed and pre-primed. It was only necessary to Multi-Primer the joint cut outs, bolt holes and end cuts.



The remaining timber members were of Oregon as in the original pergola. This was because these very large timber sizes (200mmX200mm posts and 150mmX100mm roof frame timbers) were only available in Oregon. So these timbers were treated on all surfaces with Multi-Primer, paying particular attention to fully saturating the extra porosity of all exposed end grain. The timbers were stored undercover overnight as dew or any moisture will prevent proper curing.



The one other timber used was the 12mm thick Marine Ply for the two corner brackets. Just because its called "marine ply" does not mean it is permanently water-proof. Multi-Priming the ply, with particular attention to all edges, will prevent the ply de-laminating and eventually rotting. Finally we wire brushed the mildly rusted steel post supports and wall brackets and applied a coat of Multi-Primer which is an excellent rust stabilizer and preventative as well as being a good metal primer for bonding paint.

Painting

We applied two coats of Dulux Weathershield acrylic. The important thing here is the timing. The first coat was applied (no sanding needed) to the still unassembled timbers, the day after the Multi-Primer treatment when the Multi-Primer was dry but only half cured. This allows a chemical bond to take place which glues the paint to the Multi-Primed wood which is itself glued into the body of the wood. This "cured-in" effect greatly increases the life of the paint and on average more than halves future maintenance costs. A second paint coat was applied after the construction was completed. Some notes:

1. If you are unable to paint for some time and the Multi-Primer has already cured, simply apply (again without sanding) a new light coat of Multi-Primer the day before painting. In warm weather the paint can even be applied on the same day. (Be sure to follow the curing table that comes with Multi-Primer's application instructions).
2. Those surfaces that will never be exposed to UV radiation were not painted, eg joint cut outs, bolt holes, bottoms of posts.
3. Multi-Primer is not UV resistant and must be coated with a UV resistant finish such as paint, or a UV resistant varnish or polyurethane in exposed situations.

Construction Note

The construction was like assembling a kit. First the posts were fitted into the steel brackets and coach screwed. The beams were fitted to the top of the posts, the trusses onto these and finally the corner brackets. Wherever adjustments were needed and timber was planed or chiselled, Multi-Primer was re-applied. Also any hardware, heads of screws and bolts, washers and nuts were also treated after fastening.



Caulking

Caulking the 'V' grooves at each joint (as mentioned earlier) with a high quality flexible and paintable waterproof caulking compound such as Sikaflex, provided another level of protection. We could have done without this process as the Multi-Primer will seal the timber against excess water absorption, thus preventing rot. For the small extra effort, however, you protect the paint from failing at those points where paint usually breaks down first, namely joint edges and corners. Also nails, screws and other fastenings are protected from corrosion. Finally the caulking serves to tidy up any inaccuracies in the jointing. Of course that never happens to us (joke). Note that the bottom ends of joints are left uncorked so that if water does get into the joint it has an escape route.





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Filling

Imperfections, dents, punched nail holes, counter sunk bolt and coach screw holes etc were filled with Senseal's Fill-It which is a high grade marine grade epoxy filler which is tough, aggressively adhesive and flexible enough to flex with normal timber movement.

Conclusion

A satisfying project. Good wood, good science and good people. Watch for periodic monitoring of this structure over the next decades. We will monitor and show you how the paint holds up, the corking, the stability of the timbers and joints and the timber itself.

