

WITHIN-RING CHECKING: CAUSES AND CURES

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Introduction

A problem that often rears its head for ponderosa pine producers is inter-ring checking. The problem is illustrated in Figure 1. Small cracks form within the earlywood portion of the ring. These do not extend through the latewood, or dense portion of the ring. This problem mostly occurs in abrupt transition species which are those in which the density (and other cell characteristics) rapidly change with position in the ring and we see very distinct dark and light bands. Other properties that promote this defect are high initial moisture contents, thin early wood cells walls, and rapid initial drying. In New Zealand, they note that this defect occurs in wood from certain stands more than others and more frequently in the butt log of the tree. They also suspect that a boron deficiency in the soil may contribute.

In the past year, several samples like this have come to the Forest Research Lab at OSU. Of course, it's not the sawmills who are finding the problem. When the wood is sawn into a part and painted, the checks are highly visible (Figure 2). On the surface, it is not evident that these are drying checks. In fact, one mill insisted that it was the resin canals that were causing the problem and it was a natural feature of the wood. Microscopic investigation demonstrates the causes.

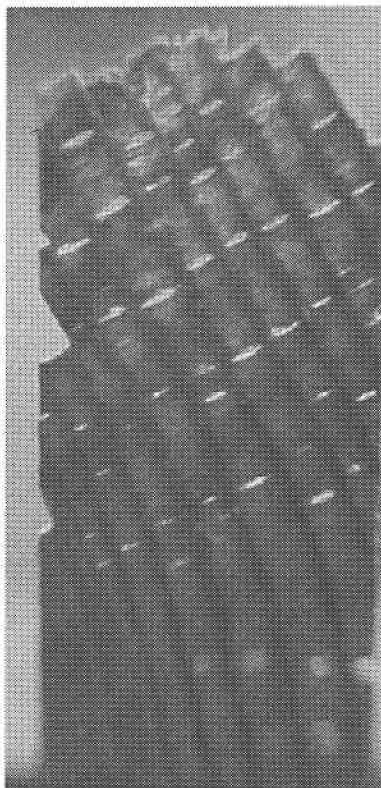


Figure 1. Ponderosa pine and within-ring checking.

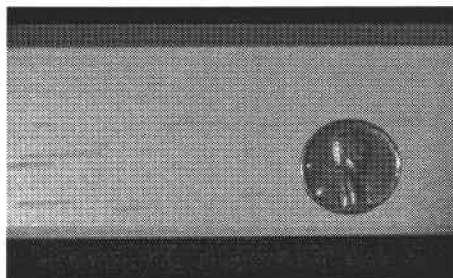


Figure 2. Checks are highly visible.

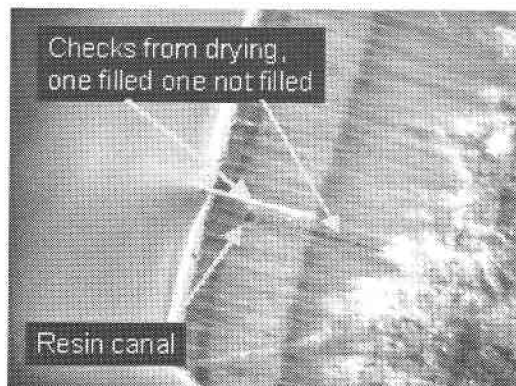


Figure 3. Coating moves into check and leaves surface layer thin.

In Figure 3 a check is clearly visible. This is what many of the streaks looked like when cut in cross section. The paint has struck into the check, filled it and left the coating on the surface very thin. Figure 4 shows the effect of a resin canal at the surface. The coating is thin and this is visible on the surface. However, this was a rare observation. This resin canal was cut so that the entire canal could fill. Note the one just above it which is cut half way through. It barely affects the surface coating. Resin canals were a minor factor in the samples and the vast majority of the imperfections in the coating were due to checks.

So what's the problem? As water evaporates from the surface of the wood, it tries to pull water from the center of the wood. This wood can be crushed by these capillary forces and we see this as collapse in species such as cedar and redwood. The cure for this is to reduce the drying rate early in the schedule.

The dense latewood in pine resists the forces that are trying to compress it; however, the low density earlywood is weak and tries to get smaller due to the capillary forces. In effect, it tries to collapse. However, it can't collapse because it is attached to the latewood and small splits occur instead. Further reading on this can be found in the following references.

Simpson, I. R. Booker, and T Haslett. 2002. Within-ring internal checking. Issue 22 of Forest Research Newsletter, Rotorua, New Zealand.

Pang, S., R. Orchard, and D. McConchie. 1999. Tangential shrinkage of *Pinus Radiata* earlywood and latewood, and its implications for within-ring internal checking. New Zealand Journal of Forestry. 29(3):484-491.

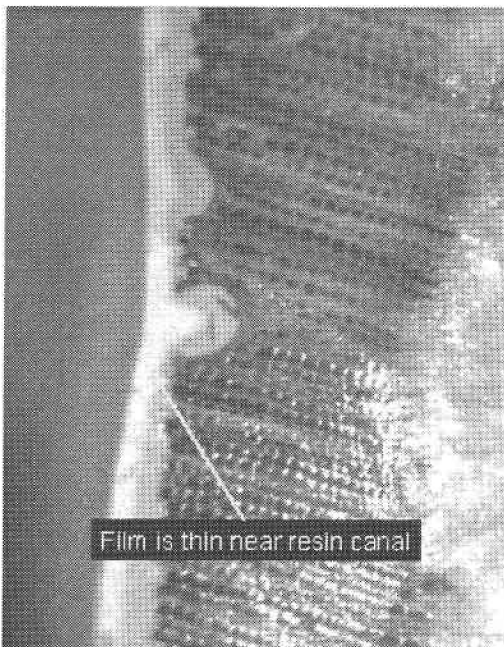


Figure 4. Problem can occur due to a resin canal, but this is rare.

Booker, R. T. Haslett and J. Sole. 2001. Acoustic emission study of within-ring checking in radiata pine wood. NDT.net. 6(3). www.ndt.net/article/v06n03/booker/booker.htm. Accessed on 1-8-03.