



## Identifying Incipient Decay in Douglas-fir Bridge Components using X-Ray Computerized Tomography

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Solid-sawn Heavy Timber

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### Summary:

In this report, wooden members of sizes typically used in bridge construction are examined using x-ray computerized tomography (CT) to determine the presence of internal decay. This report is part of an overall study in which Douglas-fir (*Pseudotsuga menziesii*) glue-laminated (glulam) beams and solid sawn timbers were inoculated with brown rot fungus, *Fomitopsis pinicola*, and exposed to aboveground conditions approximately 25 miles (40 km) north of Gulfport, Mississippi, USA. The goal of the overall study is to develop interior decay within the test specimens and then identify and characterize the decay using a variety of nondestructive testing (NDT) techniques. One NDT technique used is x-ray CT. The pixel brightness (PB) of CT scan images is proportional to the specific gravity (SG) at that location; high SG materials appear brighter whereas low SG materials appear darker. The consumption of wood by fungus decreases the wood SG; however, fungal progression takes place in areas where sufficient moisture is present. The presence of moisture increases wood SG as detected by the CT scan, which masks the effect of the fungal decay, which is a common co-occurrence with many NDT techniques. To identify incipient decay, it is necessary to examine the ring structure both within and outside of the area of moisture. Quantifying the extent of the decay requires correlating the PB to known SG values for both dry wood and wood of varying moisture content. In this report, the relationship between wood SG, moisture content, and PB was quantified.

Online Access: Free

**Resource Link**

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