

Sonic Tomography

Advanced Decay Detection in Trees

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Sonic tomography, or the use of sound waves to detect decay in trees, is a relatively new technology available to arborists. This technology uses the differential speed of sound as it moves through solid wood, decayed wood, or hollow space to create a two- or three-dimensional image of the internal structure of a tree. Knowledge of the internal structure can then be used by a qualified arborist as part of an advanced tree risk assessment. In order to fully assess the risk associated with a given tree, the information provided by sonic tomography devices must be used in combination with other factors related to tree stability.

Basics

Arborists with Bartlett Tree Experts make use of the ArborSonic 3D™ sonic tomography unit. However, other devices based on the same technology are available. To perform an assessment of a two-dimensional plane, ten (10) sensors are spaced evenly around the trunk or limb in question. These sensors are attached to each other and then to a computer which uses a software package that contains data on the density of wood and expected velocity of sound for most tree species. Each sensor is tapped with a small hammer to send sound waves through the tree to the other nine sensors. The speed with which each sensor receives that sound is analyzed by the software to produce a planar image. When two or more 2-dimensional planes are created (Figure 1), the software can extrapolate the data sets to produce a 3-

Figure 2: The 2-D images are combined to create a 3-D image.

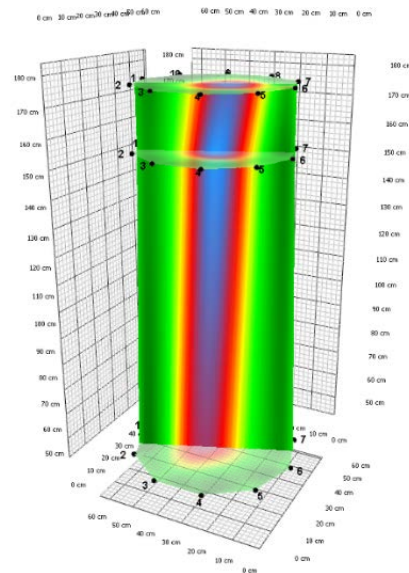
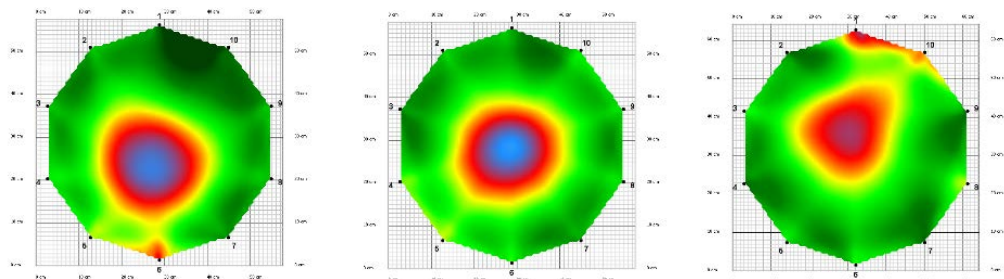


Figure 1: These three images (L to R: upper, middle, and lower planes) were combined to create the 3-D image in Figure 2.



dimensional image of the internal structure (Figure 2). In general, sonic tomography is less invasive and less likely to spread decay compared to resistance drilling methods.

Uses and Limitations

Sonic tomography can be used to quantify decay and produce two or three-dimensional images of the internal wood structure for any above-ground tree trunk or limb. However, this technology does not provide any information regarding the strength or decay in below ground parts such as structural roots or portions of the trunk below the soil line due to deep planting or grade changes. This is a very important portion of the tree for risk assessment, and other

techniques must be used to assess structural roots. In addition, if sonic tomography data leads to a recommendation of tree removal, other methods of decay detection such as resistance drilling should be employed to confirm tomographic images.



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