

# AirKnife Tree Friendly Excavation

## Andrew Cowan, ArborEcology

### Exploration in Arboriculture



### Supersonic Air Knife

The Supersonic AirKnife enables the excavation of sensitive areas without fear of damaging roots. This has opened up new opportunities in diagnostic work, soil remediation, and excavation close to trees. The danger of damaging tree roots or even underground utility lines is no longer a concern with this tool.

The AirKnife we use has been imported from the USA where it is manufactured by Easy-Use Air Tools, Inc. The tool's design has been scrutinized for over eighteen years to perfect it in a multitude of real life circumstances, although it has only recently been adopted by a small number of arborists for use in the UK.

New techniques are being discovered and developed that will make these tools the next arboricultural frontier. In the near future, in order to offer "complete tree care", arborist's will need to utilize Supersonic Air Knife technology.

The Air Knife opens a new world of tree care. For the first time we can work with the underground portion of the tree - where 90% of health problems originate.



### Excavating root collars:

After excavating over 5,000 root collars, it has been discovered that 99% of transplanted trees require corrective work. Girdling roots have been observed in trees that have been over-mulched or planted too deeply. The AirKnife makes it easy to find these problem roots so they can be quickly removed.

Look at the roots of this tree that were excavated with the AirKnife. You can see several girdling roots that can be removed before they can cause damage to the tree.

In addition to girdling roots, other excavations have shown trees planted without removing synthetic burlap, synthetic twine or wire baskets. All are stressful to the tree by limiting root growth or girdling the growing trunk. It is also possible to diagnose problems with diseases such as *Ganoderma* root rot; trees planted too deeply; and those with under-sized root balls or skewed root systems.

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## Working with utilities:

The AirKnife makes excavation around underground utilities much safer for workers and trees. It can be used to locate gas and power lines before digging with mechanical excavators. It can dig a utility line tunnel under a hard surface like pavements or patios as easily as under tree roots.

Where it becomes necessary to excavate a trench close to or under the canopy of a tree, the AirKnife can be used to expose roots that may then be either bent out the way of the trenching work or cut back using target pruning. This reduces the stress caused to trees by preventing roots being ripped out the ground by a mechanical excavator, therefore prolonging the trees life expectancy and enabling the retention of trees that may otherwise have been removed.

However, it is essential that all work to expose tree roots be undertaken by qualified arborists with knowledge of tree physiology and ecology. Although, the AirKnife itself is easy to operate and could be used by groundwork contractors during other excavation works. Once exposed the tree roots will need to be treated with care and if left exposed for any length of time they should be sprayed with a hydro-jell to reduced desiccation as a result of water loss, while mulch can also be used to cover exposed roots during excavation work.



The AirKnife can be used to remove the soil from around even fine roots without damage.

## Remediating soil compaction:

Soil compaction is widely recognised as one of the most significant stresses associated with trees in urban environments, especially in association with development, while also being an issue in well used parks and gardens. The compacted soils have lost macro pore spaces that normally hold air and water. This has a dramatic influence on respiration and severe compaction can suffocate a tree.

The most effective treatments for compaction have been vertical mulching and radial trenching. Traditionally this has been done with spades, augers, trenchers and backhoes, balancing the increased pore space against root damage caused by these mechanical diggers.

Since the AirKnife does not damage roots, we can now double the treated area without overstressing the tree. Radial trenching to improve root growth is made easy when you can simply blow the dirt away and replace it with improved soil. In addition, vertical mulching with an AirKnife can be four times faster than with a petrol driven auger and with a lot less effort.

## How the AirKnife works:

The AirKnife converts compressed air from a portable compressor to a supersonic jet stream by use of its specially engineered nozzle. The finely focused stream of air penetrates the ground to nearly a depth of up to 30 cm and can be aimed to crumble and blast the soil away as fast as the operator moves the tool. Since tree roots, rocks and pipelines are non-porous soil can be excavated quickly with no impact to roots, electrical, and gas lines.

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