

# Tree Motion Sensor

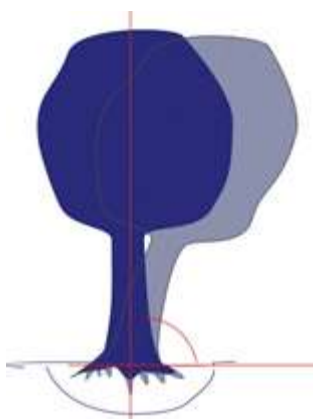


Safety of trees is an important factor in urban and other high risk areas. There are several methods to assess the condition & stability of trees and a thorough visual inspection (VTA) is always the most important step at the beginning of the assessment. Often there are trees in cities and parks that require further investigation and depending on the perceived defect different methods can be used.

The **Tree Motion Sensors (TMS)** are used to test the root anchorage & stem stability of trees without the need to apply an external artificial deflection load. When wind blows trees start to sway and this load is transferred to the root plate. The TMS records the dynamic sway motion of trees in natural winds so what differences are there to the already established static tree pulling test technique?

The static pulling test, based on the findings of Wessolly (Wessolly & Erb, 1998), measures the root safety of trees. During the static pulling test the tree is exposed to a load which is usually created by a winch and a rope attached to the tree. The reaction of the tree - which is root plate tilt and compression of marginal wood fibres - to this load is measured. The artificial load is compared with a theoretical estimate of the load a typical wind would have caused to the tree. There is advanced software available to estimate the wind load on the tree (Arbostat & Detter). However, static pulling of trees can be difficult to implement & carry out, particularly in urban areas.

The TMS records the dynamic sway – or tilt - motion of trees in **natural winds** which is more realistic. However the wind blows and however the tree is sheltered by other trees / buildings, the sway motion recorded shows the real response of each tree to the natural conditions.



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The following are the most typical applications for the TMS system.

- **Confirmation of stability of trees.** Trees that show little to no root plate tilt in winds can be considered to be safe.
- **Identification of trees with root anchorage problems.** The most typical application is to equip several trees in the same area with TMS sensors. Comparison of the tilts recorded identifies trees with tilts larger than others. (James & Hallam, 2013)
- **Combination with static pull tests.** Once a tree with large tilt movement in natural wind has been identified, it can be useful to perform a static pull test to measure the reaction to a known force.
- **Supervision of trees near construction works.** The damage to major roots of trees caused during construction work can be detected.
- **Long term monitoring of a tree.** Trees which are suspected to have root problems may be monitored on a regular basis to see if:
  - the wind response gets better ( ie. new roots grow)
  - gets worse (ie roots deteriorate or have been cut)
  - there is no measurable change

One or two monitoring periods of sufficient winds per year should be sufficient to do this type of test.

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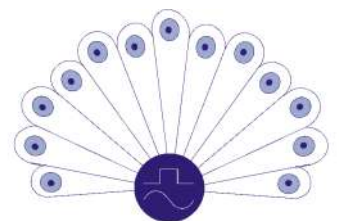




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