

## DENDROMETERS

### – WATCHING TREES GROW

**G**rowth rings, seen as light and dark rings over the cross section of a tree trunk, are indicative of seasonal variation. Research scientists in Tasmania are studying these growth patterns in detail with a view to establishing relationships between climate, water uptake, timber quality and growth rate.

Tasmania is fortunate to have forests of several long-lived indigenous species (huon pine, celery top pine and king billy pine) which have life spans of hundreds, possibly thousands of years.

The work involves collecting data such as tree growth, climate and soil moisture in the field, and laboratory examination of the wood's chemical and physical properties across the profile from pith to bark. An important measure is stable carbon isotope ratio ( $\delta^{13}\text{C}$ ) which is the ratio between isotopes  $^{13}\text{C}$  and  $^{12}\text{C}$ . This measure, taken across the profile, is related to moisture status of the plant at each stage of its growth.

Field work involves collecting data such as stem radius, ambient, temperature, rainfall and solar radiation over periods of years. This knowledge is used to improve forest management practices, and also to provide a window looking back in time at climate change over, potentially, hundreds of years.

The logging sites are generally in remote areas with limited access. Typically measurements are logged every 15 mins. With several months between visits to site, hence the recording system must be highly reliable; a loss of data between site visits could compromise years of work.

The field recording system comprises a commercial Data logger, a suite of climate sensors and Dendrometers for measuring stem growth of individual trees in the study. Point dendrometers, attached to the stem, measure radial growth directly. The dendrometers are designed and built by Bestech Australia using Macro Sensors' LVDT technology.



LVDT (Linear Variable Differential Transformers) were chosen for;

- Physical robustness
- Unaffected by rain and dust
- Long term stability
- Sub –micron resolution

The researchers compare the field data with measurements of carbon isotope ratio, wood density and cell properties such as microfibril angle in order to establish correlations between climatic conditions, growth rate and wood density.

Apart from determining climate history, this work is expected to lead to improvements in plant husbandry, based on a better understanding of the effects of water stress, the most efficient use of our limited water resources and the conditions for optimizing physical properties. An important parameter is wood density as this has a direct relationship not only with the quality of the sawn product but also for pulp and paper.

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