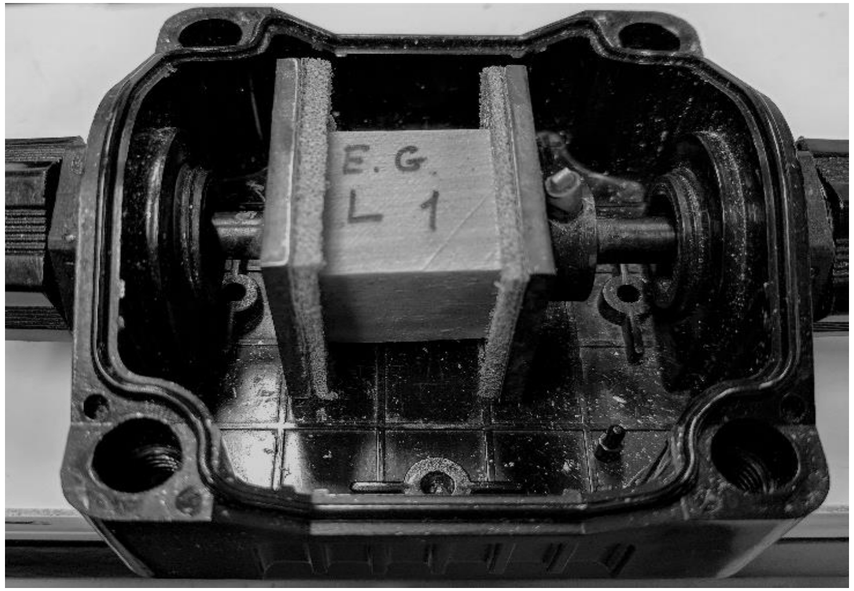

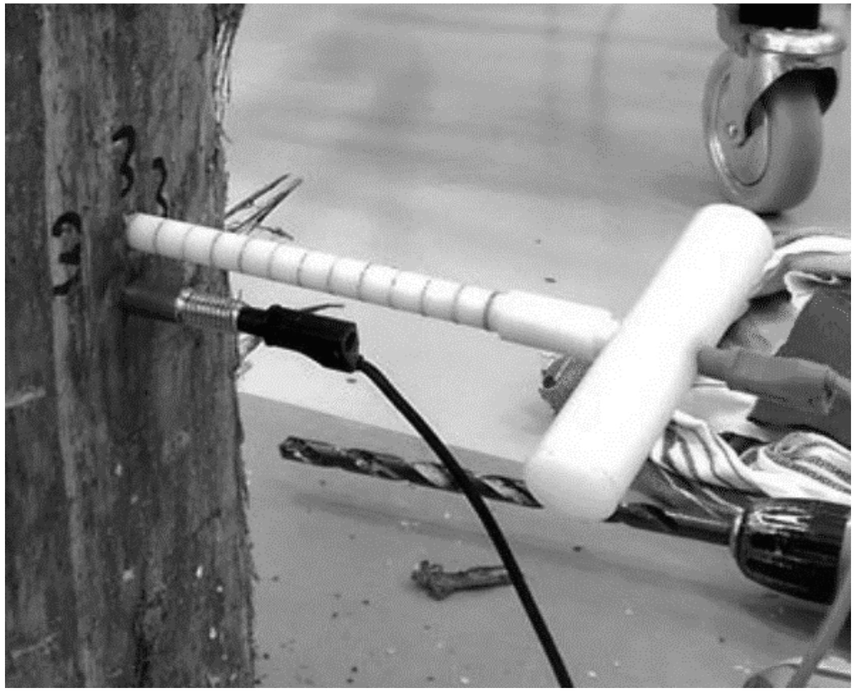

Sapwood Tool – Proof of Concept

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FOREST GROWERS RESEARCH

Specialty Wood Products Research Partnership

UC UNIVERSITY OF CANTERBURY Te Whare Wānanga o Waitaha CHRISTCHURCH NEW ZEALAND

EPECentre ELECTRIC POWER ENGINEERING CENTRE

Introduction

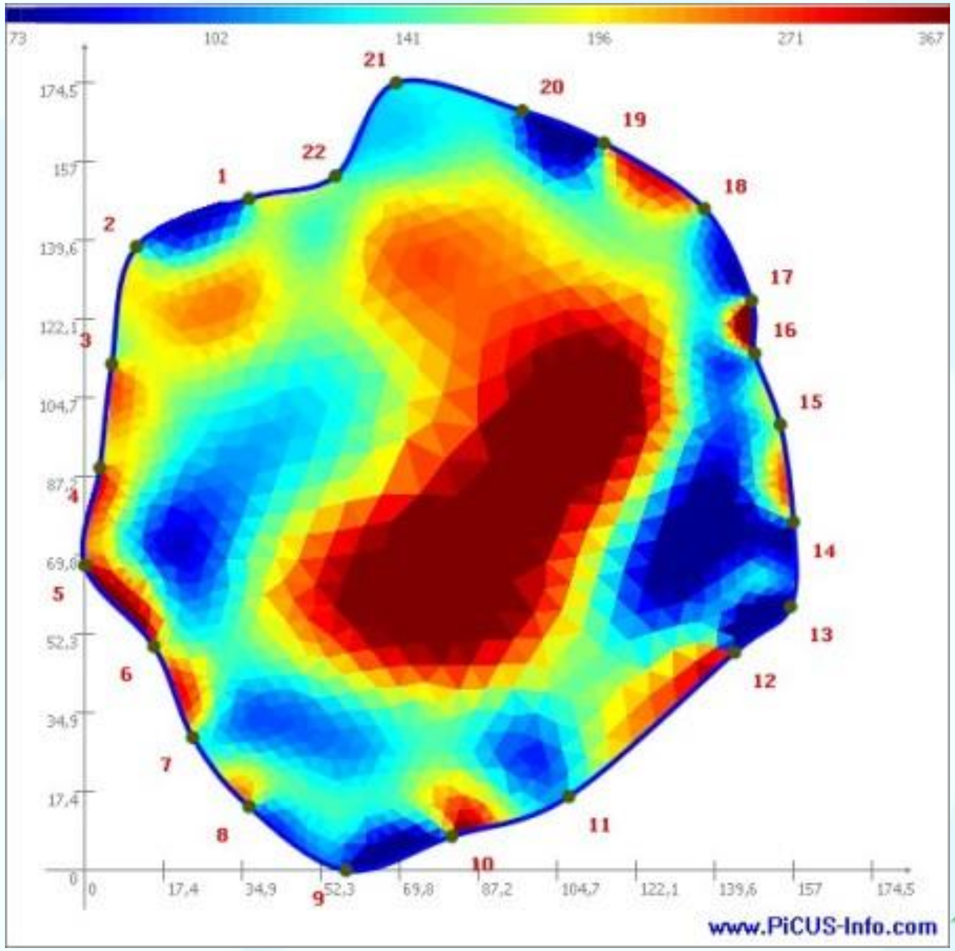
- Destructive method:
  - Measuring sapwood depth on a cross cut
- Non- or less destructive methods:
  - Coring
  - Sap flow measurement
  - Electrical resistance (current) measurement

EPECentre
ELECTRIC POWER ENGINEERING CENTRE

Prototype Design

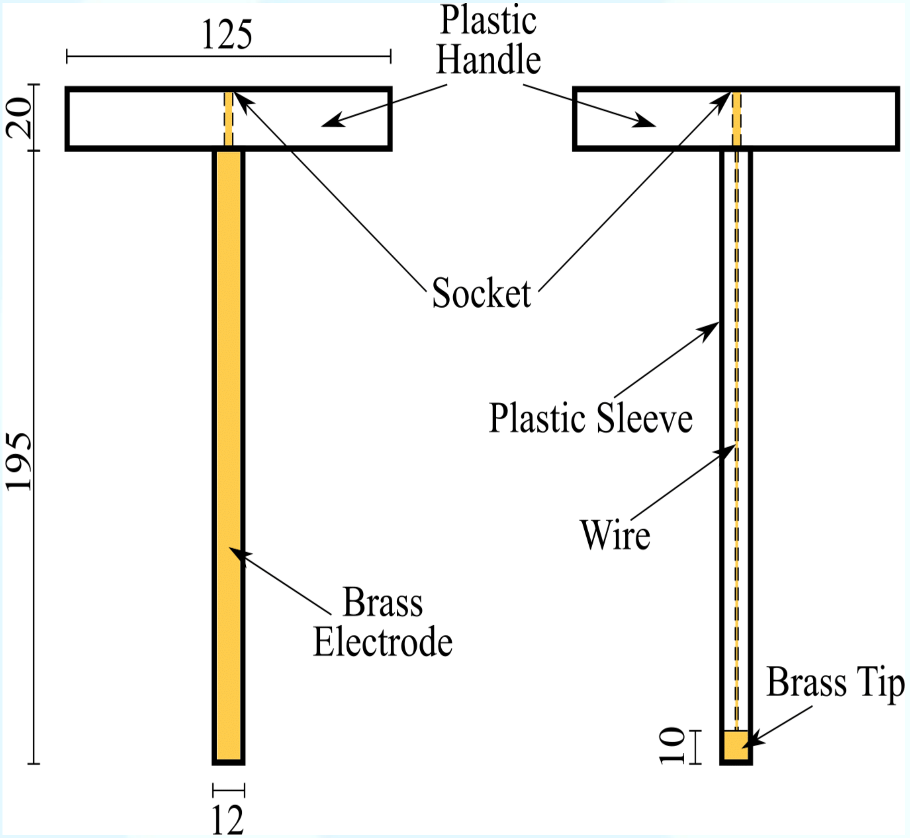
Specialty Wood Products
Research Partnership

UC
UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND



FOREST GROWERS RESEARCH

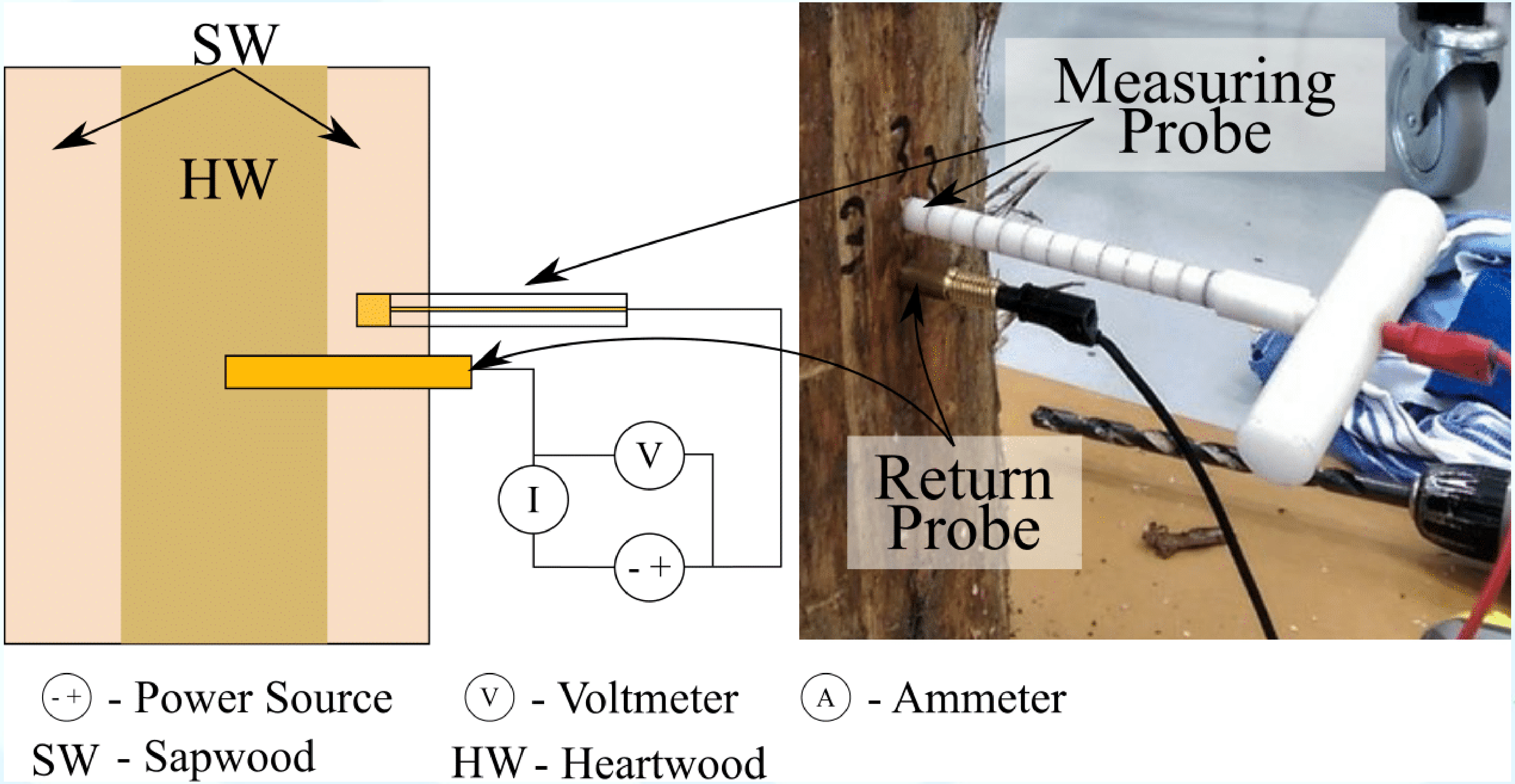
Prototype Design



The main criteria for our sapwood tool:

- Easy to install and operate (including light-weight)
- Robust
- Accurate

Theory



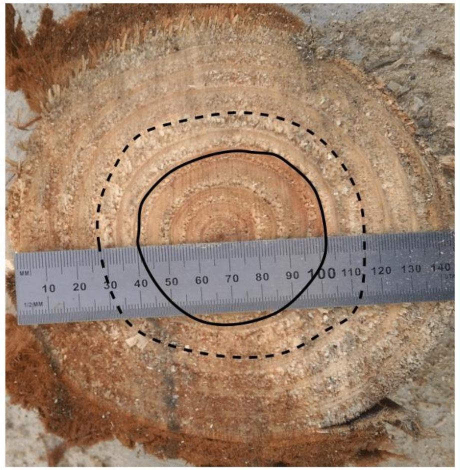
SW
HW
V
I
- +
Measuring Probe
Return Probe
- Power Source
V - Voltmeter
A - Ammeter
SW - Sapwood
HW - Heartwood

Experimental Testing: Methods

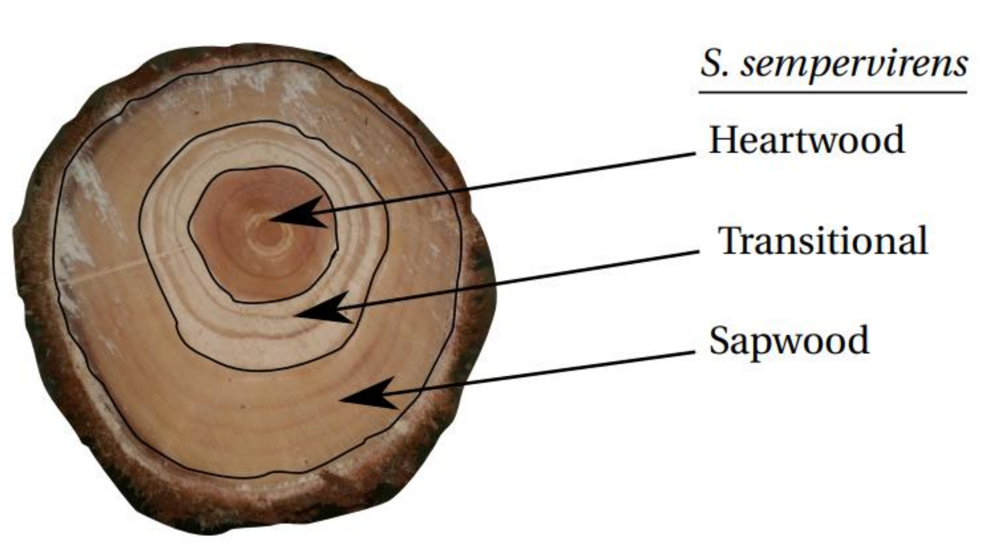
Log 1: *P. radiata*

Log 2: *P. radiata*

Log 3: *P. menziessii*

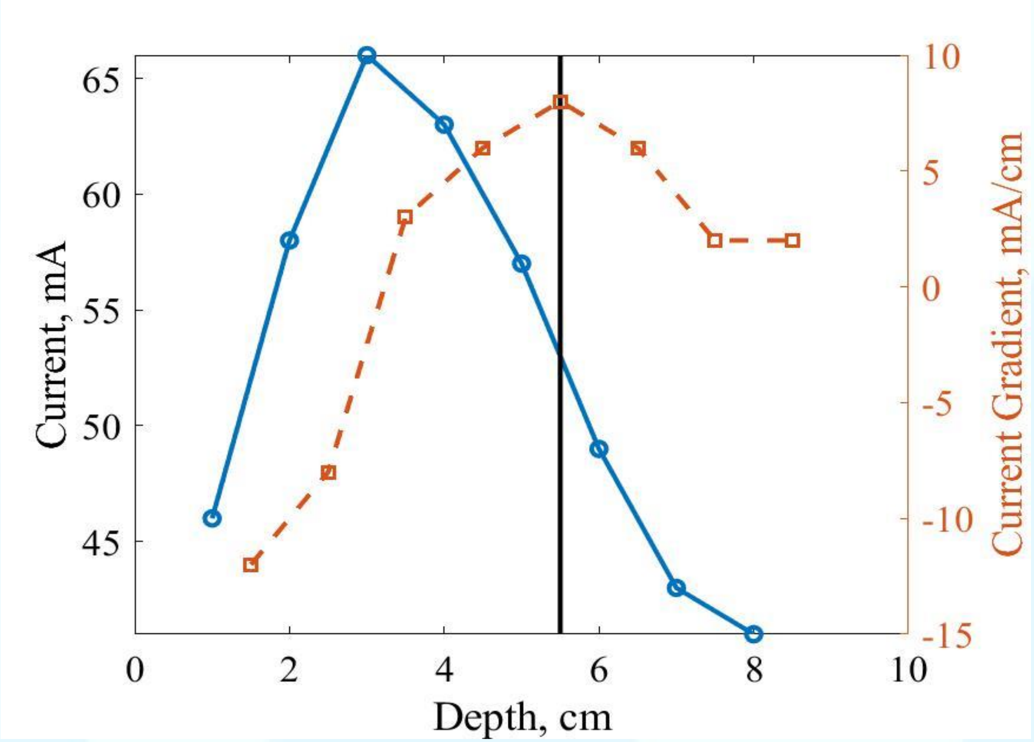


Log 4: *S. sempervirens*



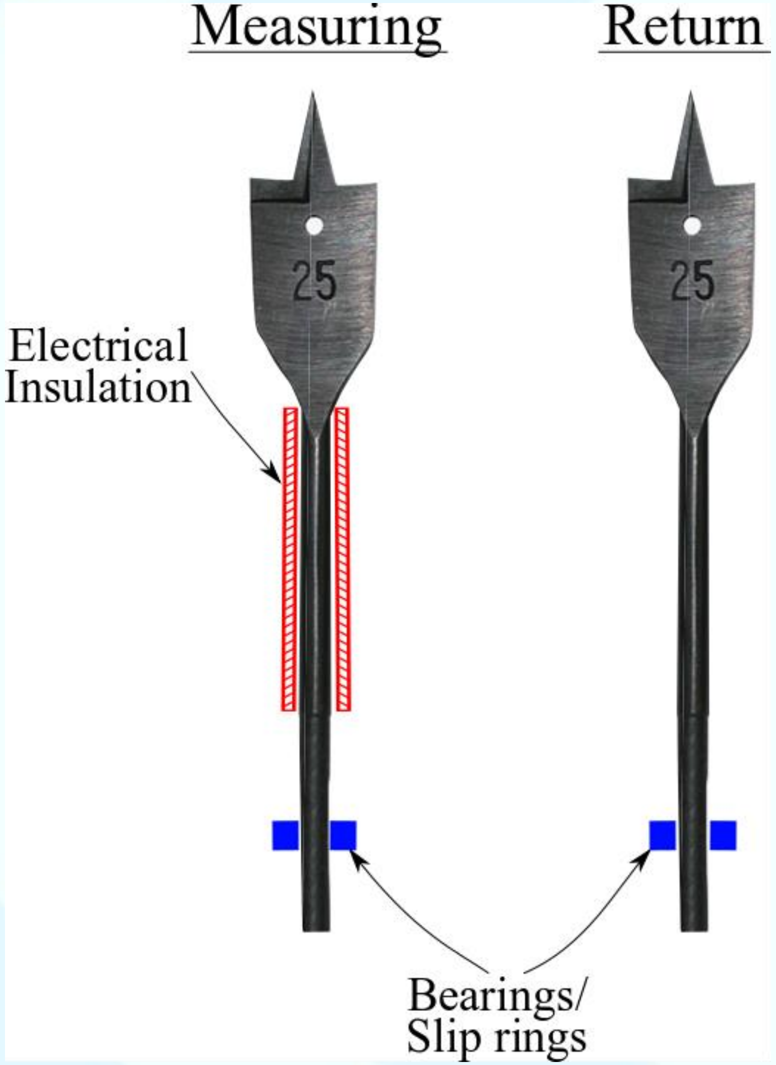
Nursultanov, N. (2018). *Joule heating of green Pinus radiata logs for phytosanitary purposes: An in-depth investigation by experimentation and computational modelling.* (PhD), University of Canterbury.

Experimental Testing: Results



Logs	SW thickness (ruler), cm	SW thickness (sapwood tool), cm
Log 1 (*P. radiata*)	6.2	5.5±0.5
Log 2 (*P. radiata*)	6.3	5.5±0.5
Log 3 *(P. menziesii)*	4.3	4.5±0.5
Log 4 *(S. sempervirens)*	3.0	2.5±0.5

Commercial Design: Type 1



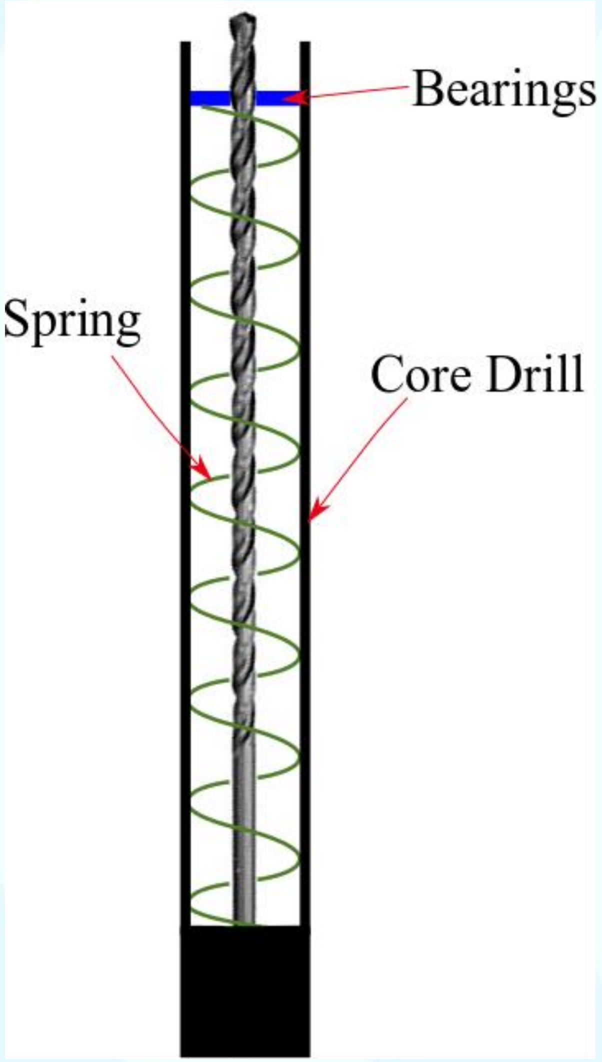
Advantages:

- Simultaneous drilling and measuring electrical current
- Relatively easy to build
- Robust

Disadvantages:

- Drills two holes
- Does not provide extra information about the tested trees

Commercial Design: Type 2



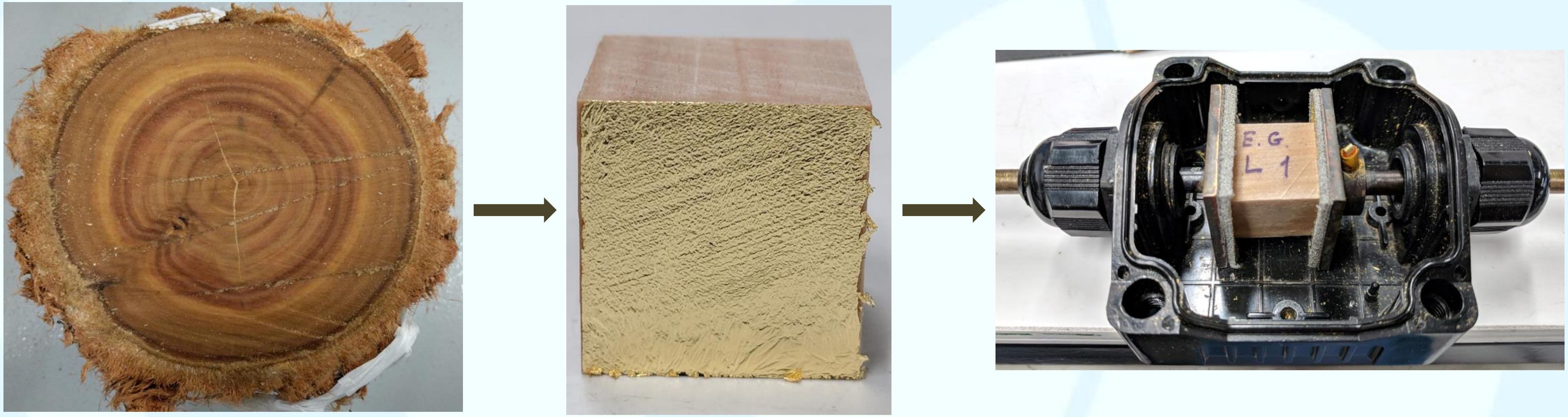
Advantages:

- Could potentially be used to identify other wood parameters such as twist of wood
- Less destructive

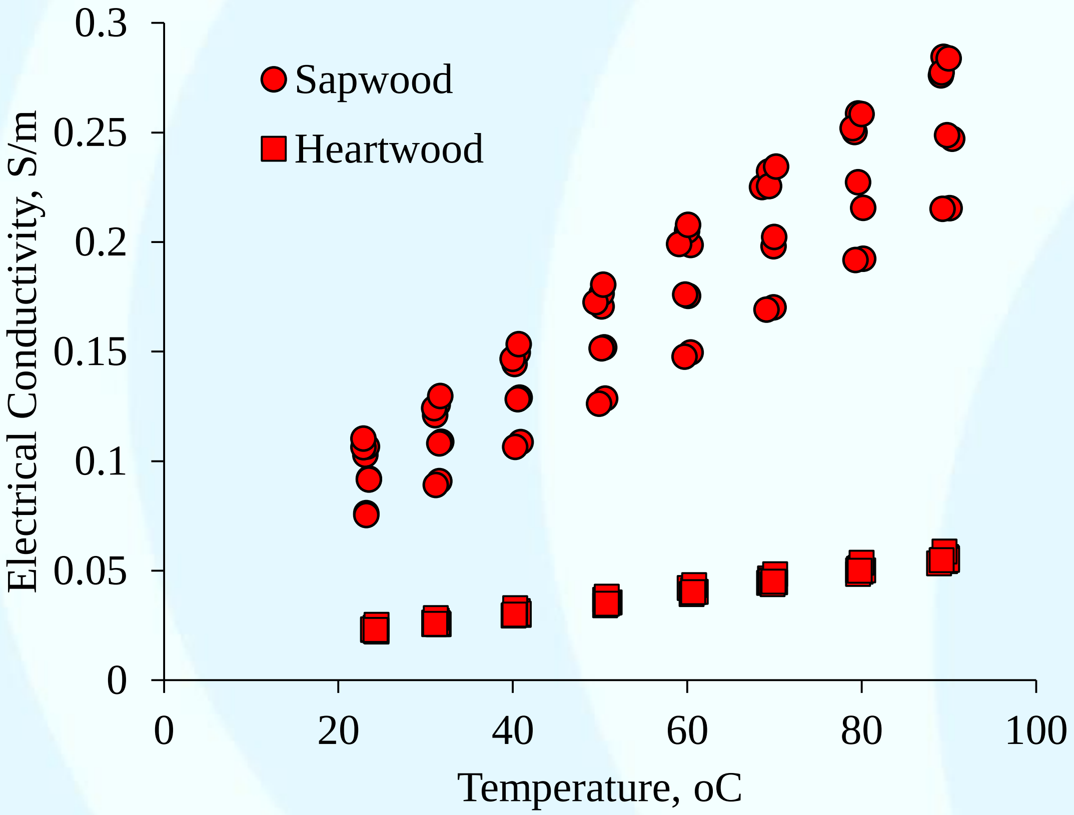
Disadvantages:

- Simultaneous drilling and measuring electrical current may not be possible
- More complicated design than that of Type 1 and hence could be less robust than Type 1

Electrical Conductivity of *E. globoidea*: Methods



Electrical Conductivity of *E. globoidea*: Results



Electrical conductivity of the heartwood and of the sapwood was measured every 10ºC from 20ºC to 90ºC.

The average SW and HW moisture contents were 160% and 180%, respectively.

The sapwood was about four times more conductive than the heartwood.

Q&A