

# Applying High Frequency to Heat Wood-based Panel Evenly

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# Heating rinciple of H.F.

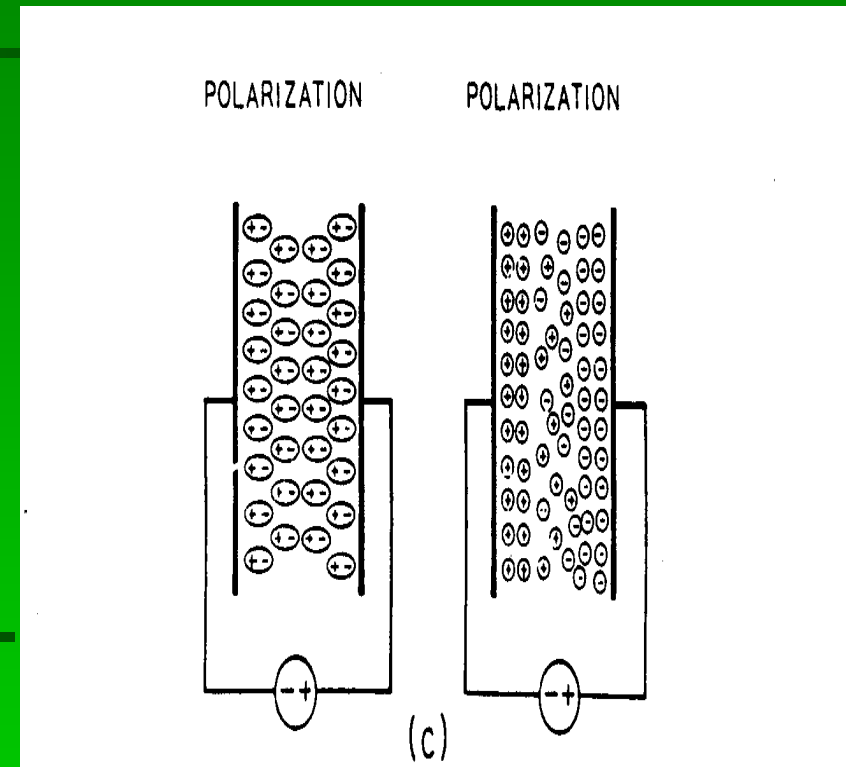
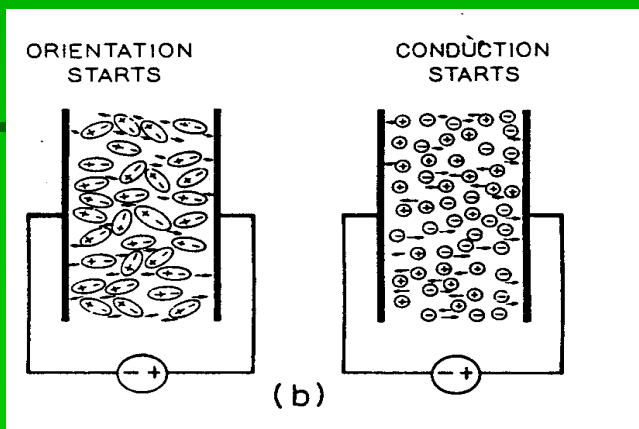
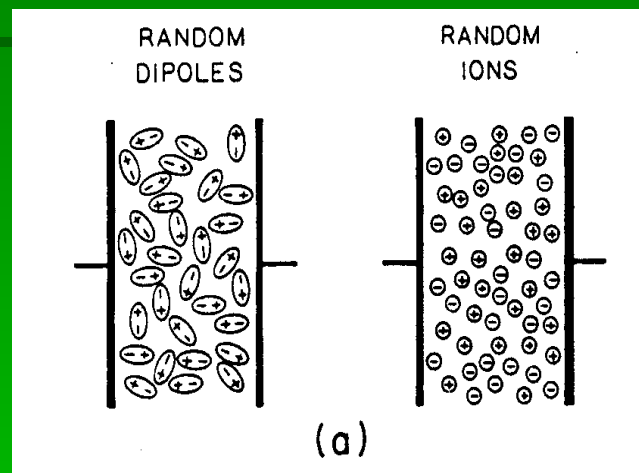
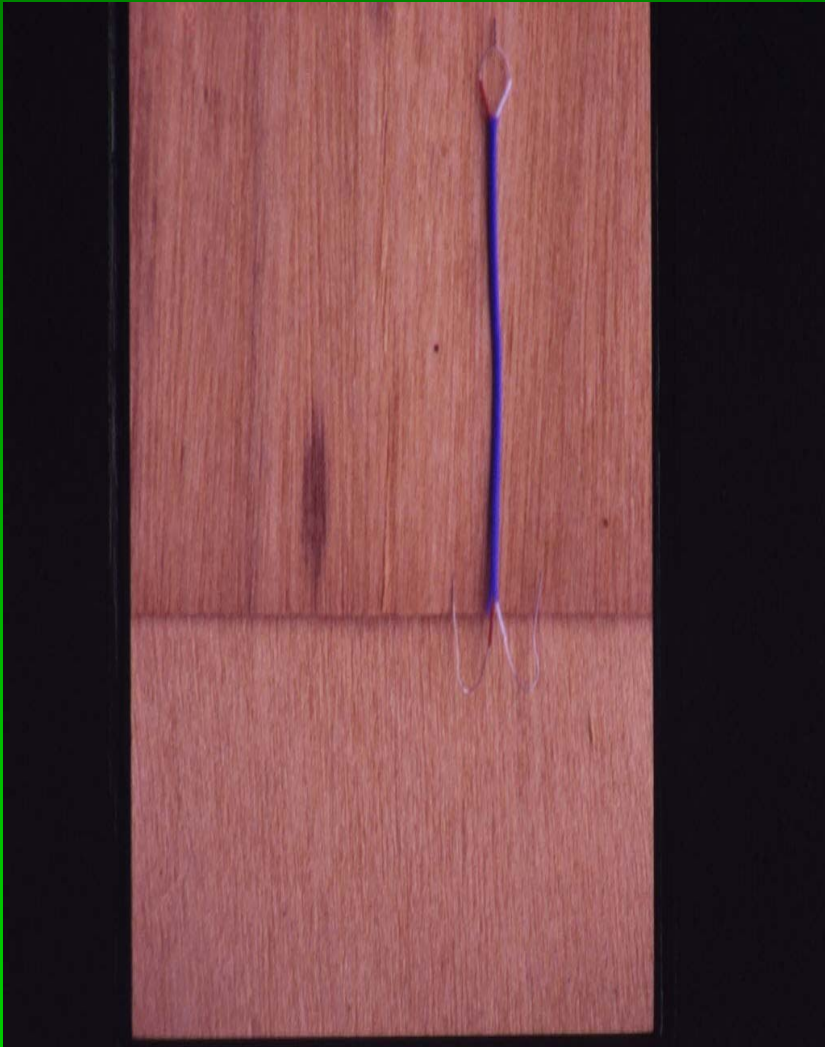


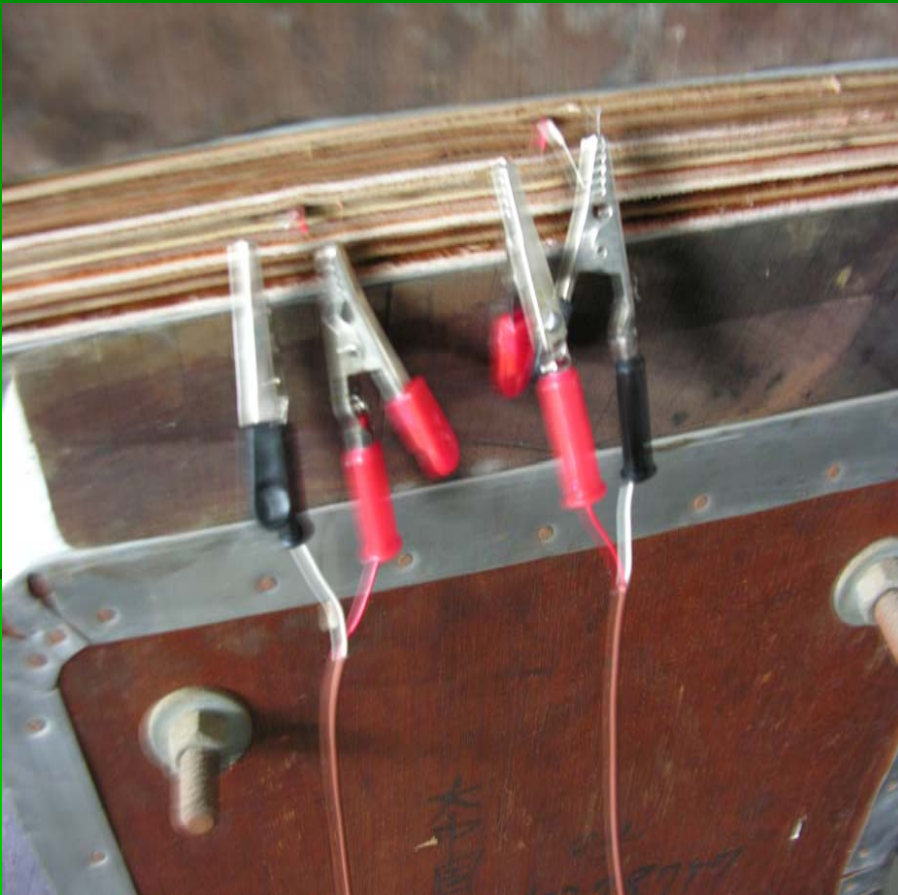
FIGURE 3 Idealized view of the polarization due to dipoles and ions: (a) unpolarized; (b) orientation and conduction begins; (c) fully polarized. In actual materials, both processes can occur simultaneously.

# Temperature Measure



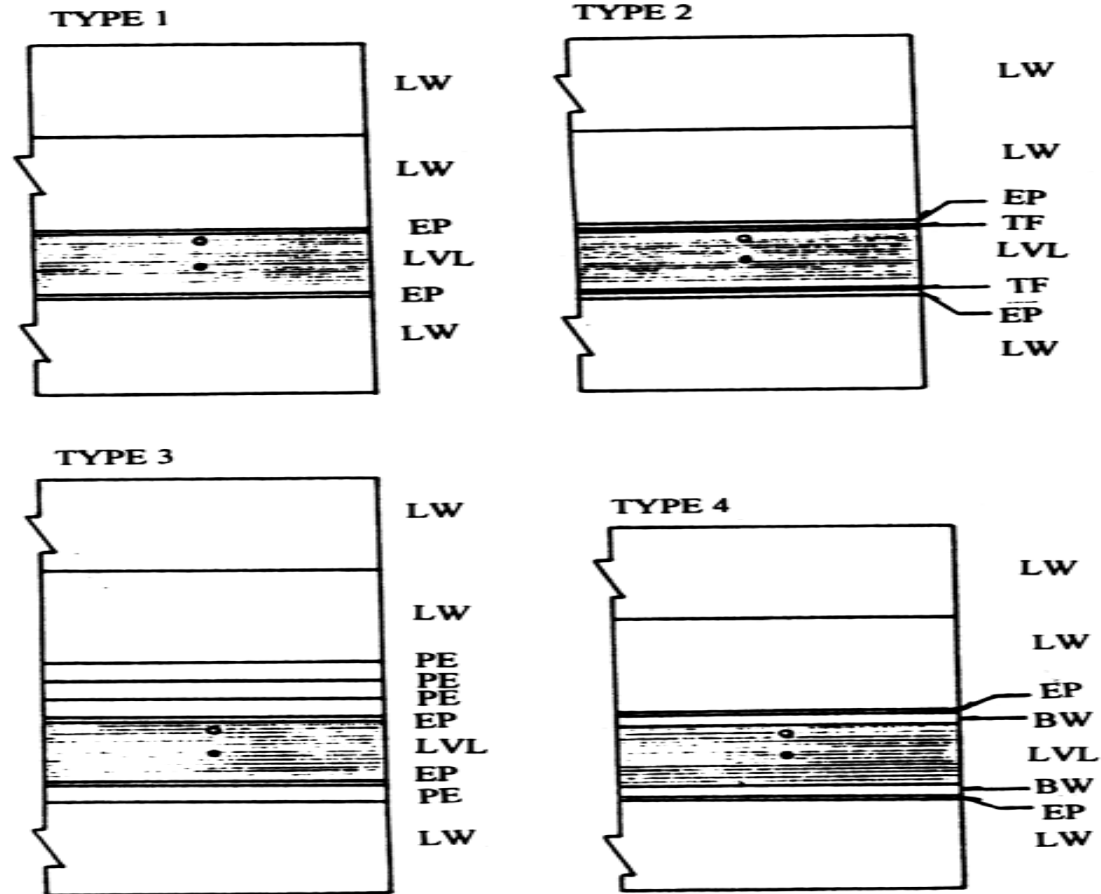
- A thermal couple pair was pre-embedded in the 2nd ( T2 ) and 8th glue line ( T8 ) and curved the naked terminal ends back into glue line to be a loop, respectively.

# Temperature Measure



- At the measure time, one end of the lead were connected with a thermal recorder and the other were connected with the naked terminal of the thermal couple pair.

# Types of dielectric heating assembly ( 16-ply LVL with thickness of 30 mm )



- Thermocouple at 2nd. glue line
  - Thermocouple at 8th. glue line
- LW: Lauan Wood ( t=50 mm )  
LVL: Laminated Veneer Lumber

- EP: Electrode Plate ( t=2mm )  
TF: Teflon Sheet ( t=0.8mm )  
PE: Polyethylene ( t=11mm )  
BW: Balsa Wood ( t=8 mm )

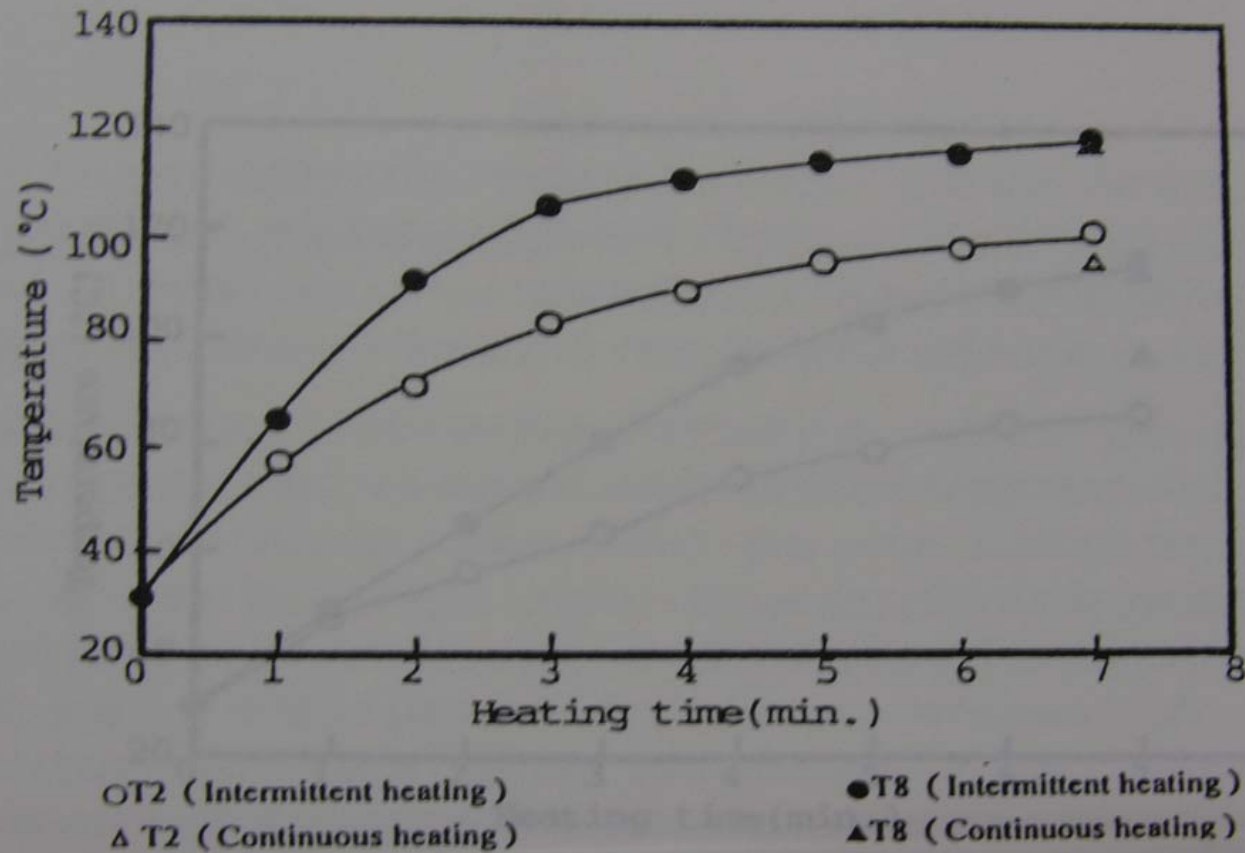


Fig. 2 Temperature of glue lines during a heating period with the type 1 dielectric heating assembly ( Generator output: 2890V, 2.7--2.3A )

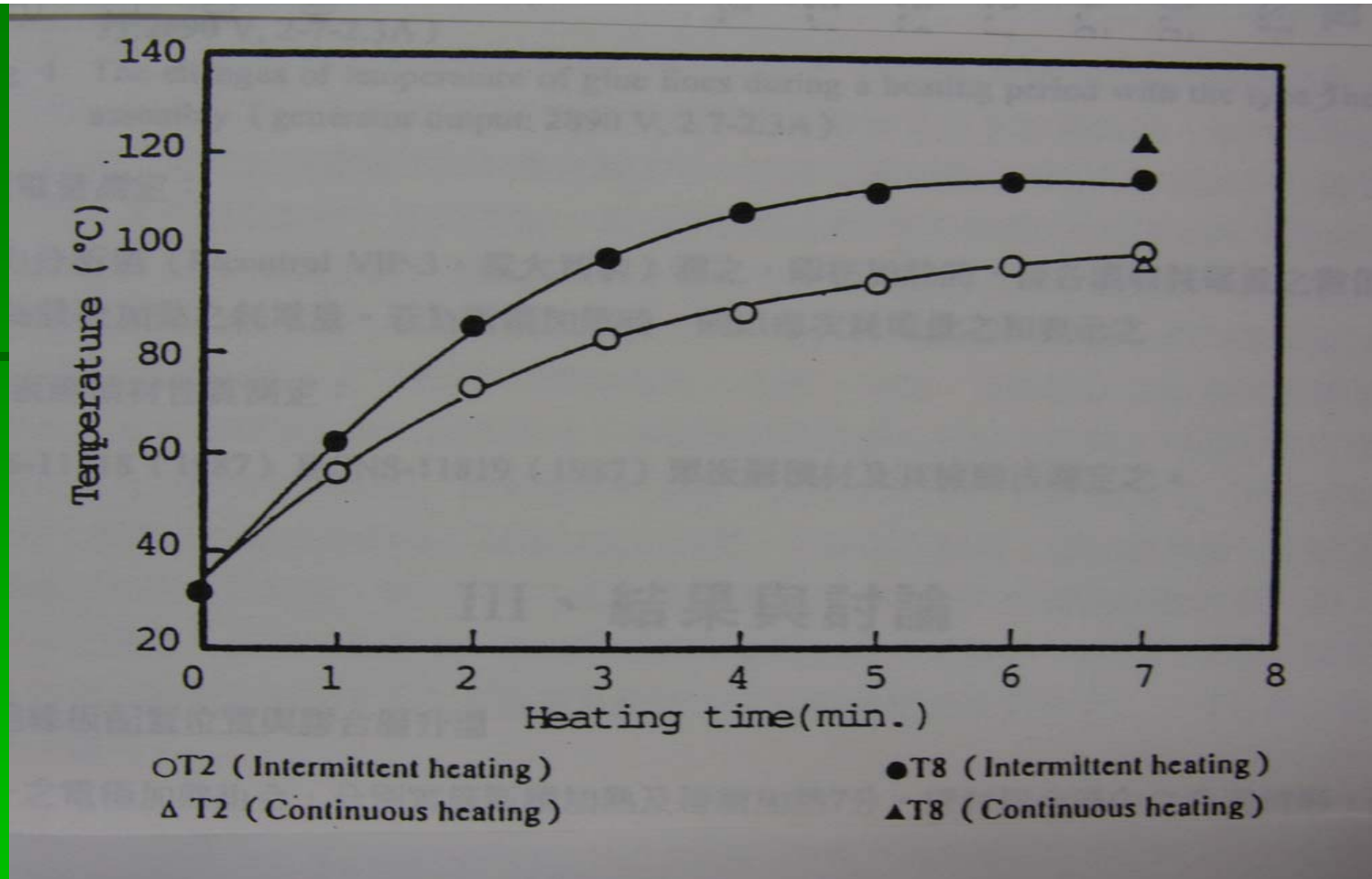


Fig. 3 Temperature of glue lines during a heating period with the type 2 dielectric heating assembly ( Generator output: 2890V, 2.7--2.3A )

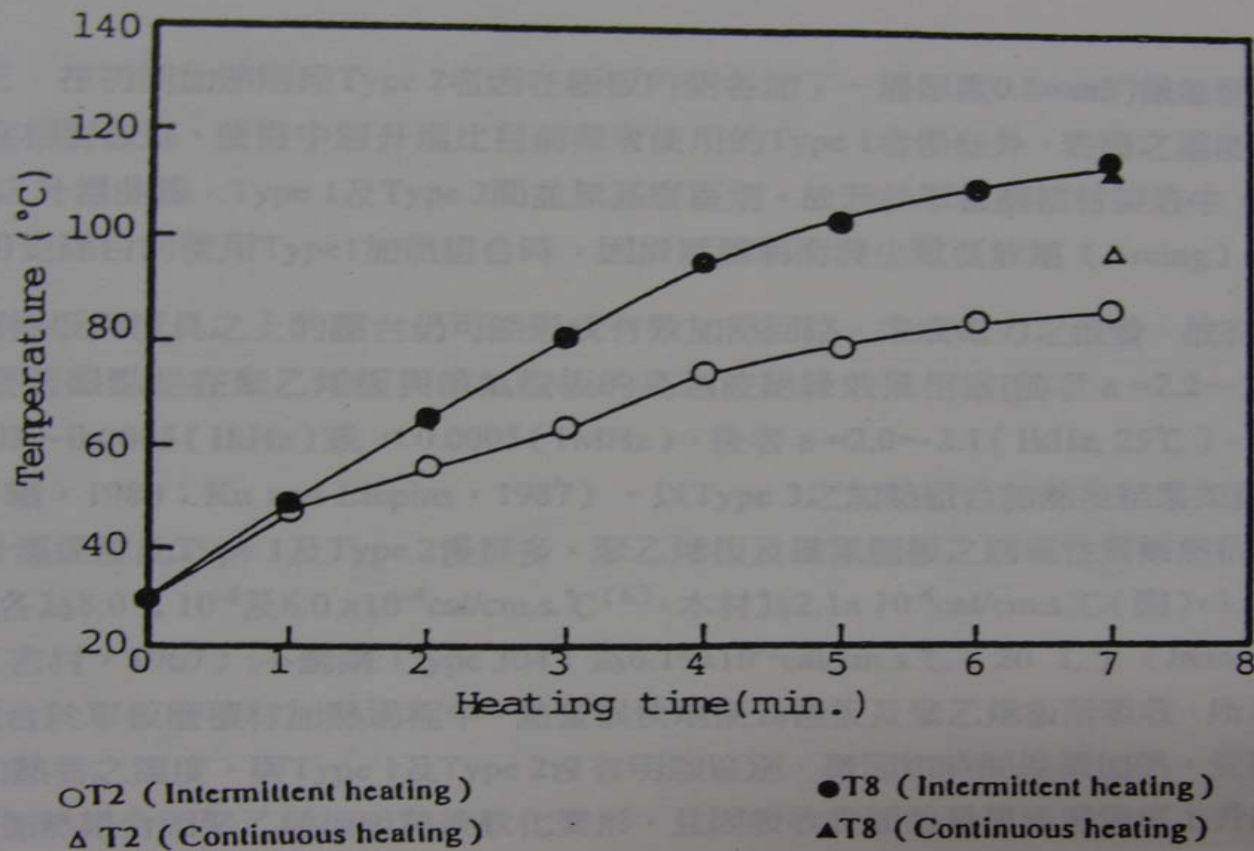


Fig. 4 Temperature of glue lines during a heating period with the type 3 dielectric heating assembly ( Generator output: 2890V, 2.7--2.3A )



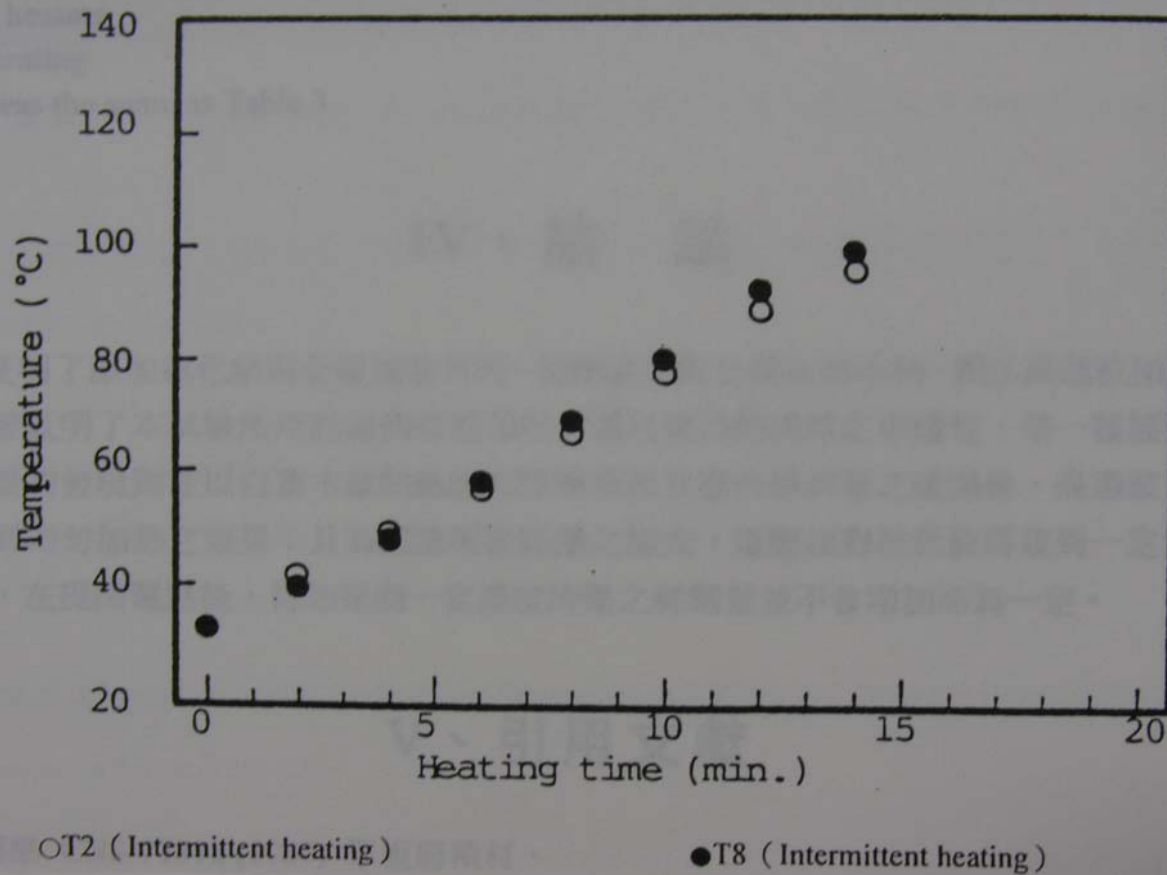


Fig. 5 Temperature of glue lines during a heating period with the type 4 dielectric heating assembly ( Generator output: 3460V, 3.0--2.95A ; power consumption 0.624 kW hr )

The thermal conductivity of stainless steel ( $6.19 \times 10^{-2}$  cal/cm.s.°C) > PE board ( $8.0 \times 10^{-4}$  cal/cm.s.°C) > Teflon sheet ( $6.0 \times 10^{-4}$  cal/cm.s.°C) > balsa wood ( $2.0 \times 10^{-4}$  cal/cm.s.°C). Therefore, Materials with **low dielectric loss factor** and **low thermal conductivity** can be used as insulation board within dielectric heating assembly to heat panel evenly.

# Conclusions

From the results found in this study, the temperature in the panel can be easily and precisely measured with thermal couple pair connected with thermal recorder in dielectric through heating with intermittent heating method.

As both of the oven dried balsa boards are used as insulation board underneath the electrode plates in the heating assembly, wood-based panel can be heated evenly.



**Thank you  
for your attention.**