

GRADUATE DEPARTMENT OF FORESTRY
THE INFLUENCE OF RESIN PARTICLE SIZE AND WOOD
EXTENDER / FILLER ON THE PROPERTIES
OF WAFERBOARD.

by

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ABSTRACT :

This study was undertaken to determine the effect of powdered resin particle size and wood - flour extender on the physical and mechanical properties of waferboard. Using three independent variables ; resin particle size, resin content and extender , a 4 X 3 X 3 factorial experimental design was used to plan the experiment. There were three replications and altogether 108 experimental boards were made. A commercial type phenol - formaldehyde resin was separated into three different particle sizes. A fourth control level was the unsegregated resin. Poplar wood was ground to form the extender. Tests on dry bending, wet (boiling) bending, internal bond and water immersion were done. Using graphics, the data set with common resin content, resin particle size and extender were analysed. Analysis of variance and multiple regression analysis were employed to evaluate the data and derive regression models. Analysis of variance showed the significance of the differences between the different resin particle sizes, resin content levels and extender levels and the significant interaction among the independent variables. Fine resin particle size had inferior MOR (dry and wet), MOE (dry and wet), internal bond, high thickness swell and water absorption. Medium resin particle size came out as the optimum particle size, with the highest of any of the properties tested. Extender was found to strongly influence MOR (dry), MOE (dry), internal bond and slightly MOR (wet), MOE (wet), all positively , while the effect on thickness swell and water absorption was low but to the negative side.

The fine resin particles had the best response on addition of extender while generally coarse resin particles had the least response.

The regression models for all the dependent variables except internal bond were able to explain over 80 % of the variability in the dependent variables. The results clearly indicated that resin efficiency can be improved by using resin with a high proportion of medium resin particle size. It was also shown that the use of extender improved the resin distribution, so much so that this in itself can be used to reduce the amount of resin used without sacrificing the board's quality.