

Adhesion promoters as agents improving thermoresistance of glue lines

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“Performance and maintenance of bio-based building materials influencing the life cycle and LCA”

The Aim of Work

The aim of this study was to determine suitable conditions for adhesion promoters based on organofunctional silanes, modified polyurethane and hot melt adhesives for bonding exotic wood species, with special emphasis on glue lines thermoresistance.

Materials

Exotic wood species

American walnut



American cherry



European oak



sapele



acajou



HM (hot melt) adhesives: unfilled EVA, filled EVA, PO

unfilled EVA



filled EVA

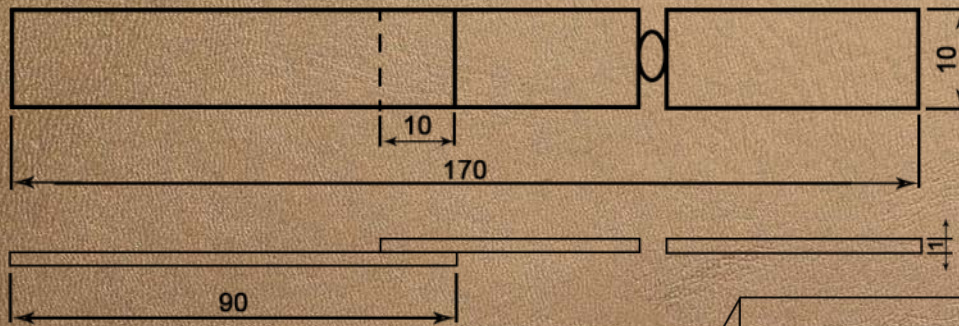


PO

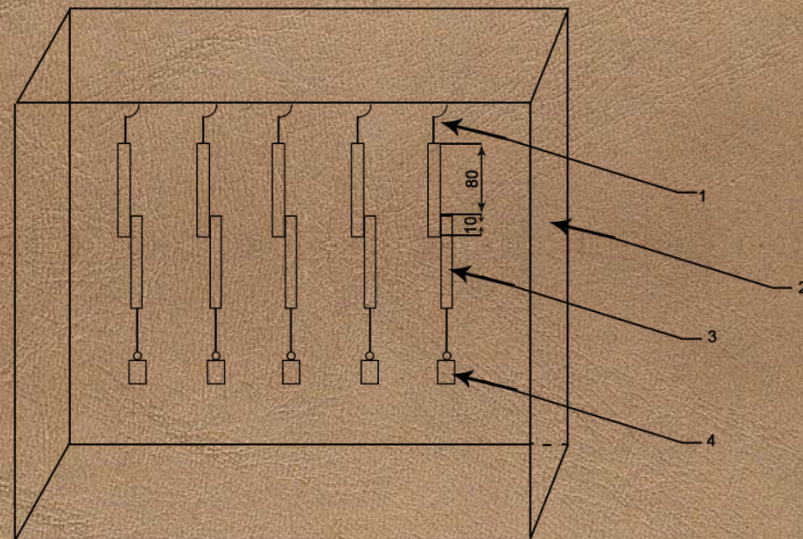


Adhesion promoter

Materials



- 1 – metal hooks
- 2 – rack
- 3 – tested samples
- 4 – weight

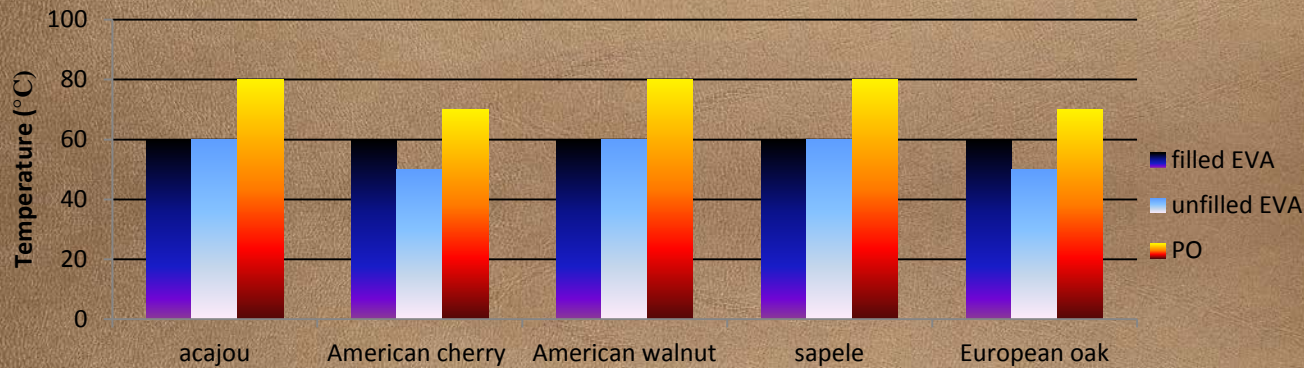


Results

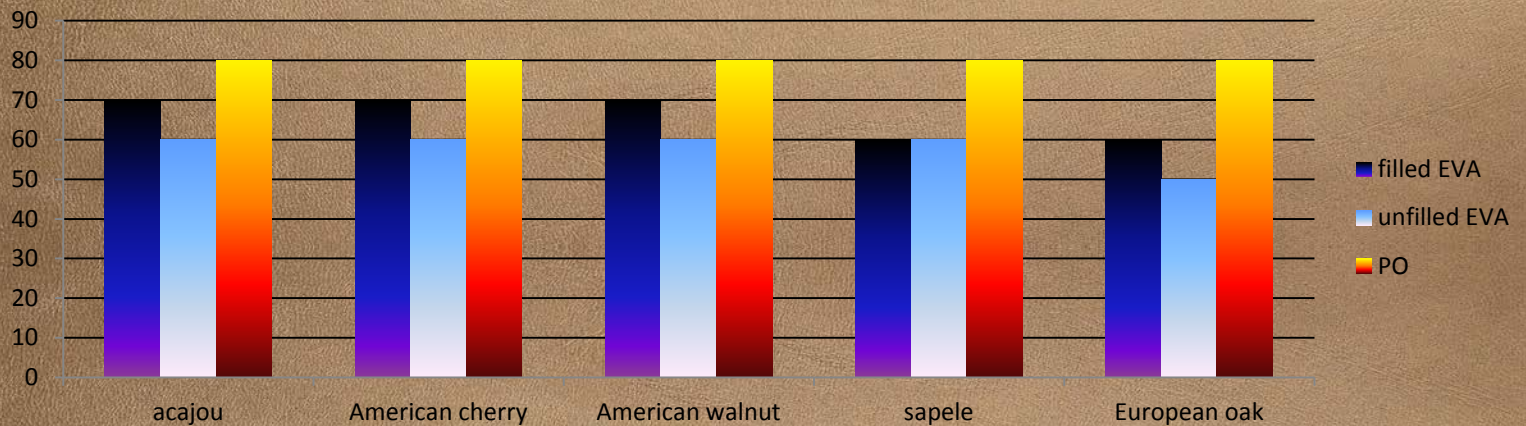
Kind of wood species	Kind of adhesive		
	filled EVA	unfilled EVA	PO
	Thermoresistance [$^{\circ}$ C]		
without adhesion promoter			
acajou	60	60	80
American cherry	60	50	70
American walnut	60	60	80
sapele	60	60	80
European oak	60	50	70
with adhesion promoter			
acajou	70	60	80
American cherry	70	60	80
American walnut	70	60	80
sapele	60	60	80
European oak	60	50	80

Results

Thermoresistance of glue lines without adhesion promoters



Thermoresistance of glue lines with adhesion promoters




Conclusion

The highest thermoresistance of adhesive connections between veneers under loading were in systems based on the PO adhesive, whereas the lowest were based on unfilled EVA adhesive. Application of the adhesion promoter generally increased the thermoresistance of glue lines, but varied between systems.

Thank You for Your Attention!


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AIM OF WORK

The aim of this work was to determine suitable conditions for adhesion promoters based on organofunctional silanes, modified polyurethane and hot melt adhesives for bonding exotic wood species, with special emphasis on glue lines thermoresistance.

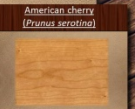
MATERIALS AND METHODS

For experiments 5 exotic wood species were used:


Acajou (*Khaya ivorensis*)




American cherry (*Prunus serotina*)



American walnut (*Juglans nigra*)



Sapele (*Eintandrophragma cylindricum*)




European oak (*Quercus sp*)




HM (hot melt) adhesives:


Unfilled EVA



Filled EVA



PO



Adhesion promoter

For the thermoresistance test samples with dimensions of 90x10x1 mm were prepared according to PN-EN/C-89353-2. The adhesion promoter and adhesive on the contact area of veneers in an amount of 10±2g/m² and 90±10g/m² was applied respectively. After 24 h of air-conditioning samples were placed in a laboratory rack and loaded with 200 g weights. Then in laboratory racks with the samples placed in a laboratory drier at 50 °C for 1 h, after which they were removed and a visual assessment of the quality of glue lines were made. If during this time damage the glue lines did not occur, the temperature was increased by about 10 °C. The tests were carried out at increasing temperatures until the glue connection was destroyed.

RESULTS

Kind of wood species	Kind of adhesive		
	filled EVA	unfilled EVA	PO
without adhesion promoter			
acajou	60	60	80
American cherry	60	60	70
American walnut	60	60	80
sapele	60	60	80
European oak	60	50	70
with adhesion promoter			
acajou	70	60	80
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CONCLUSIONS

It was stated that: The highest thermoresistance of adhesive connections between veneers under loading were in systems based on the PO adhesive whereas the lowest were based on unfilled EVA adhesive. Application of the adhesion promoter generally increased the thermoresistance of glue lines but varied between systems.