

ABES and DMA Cure Monitoring of Tannin Adhesive

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Tannin adhesive

Tannins and lignins are due to their phenolic origin and wide natural abundance, considered as promising natural components for replacement of synthetic adhesives. Tannin adhesives are one of the wood bio-based adhesives studied in the ongoing project **WooBAdh**:

<http://www.woobadh.eu/>



In this research we used condensed pine tannin and 6 % dry mass of hexamethylenetetramine (hexamine) as hardener, at pH 6,5.



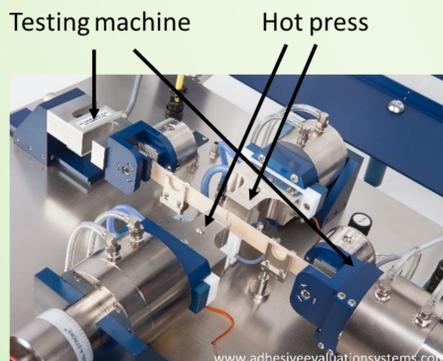
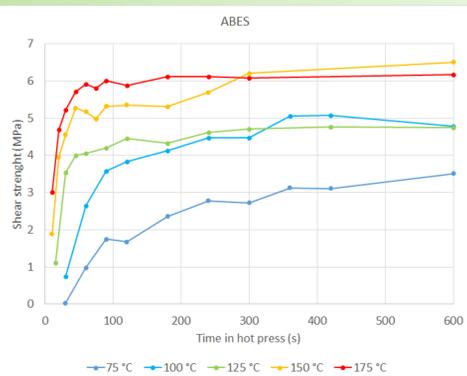
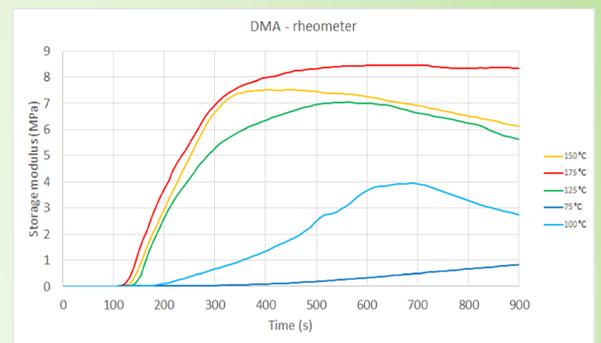
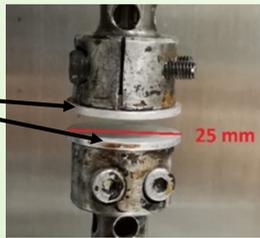
In Europe condensed tannins are extracted from coniferous bark, which is now mainly burned for energy production.

Curing characterization

Determination of optimal pressing time and temperature is essential for economical production of wood-based composites. Several methods enable the insight in curing process. In this study we are presenting two methods that use physical approach for estimation of what is going on in the hot-press.

DMA

Oscillatory tests were conducted on rheometer, using two aluminium discs in parallel plate geometry.



ABES

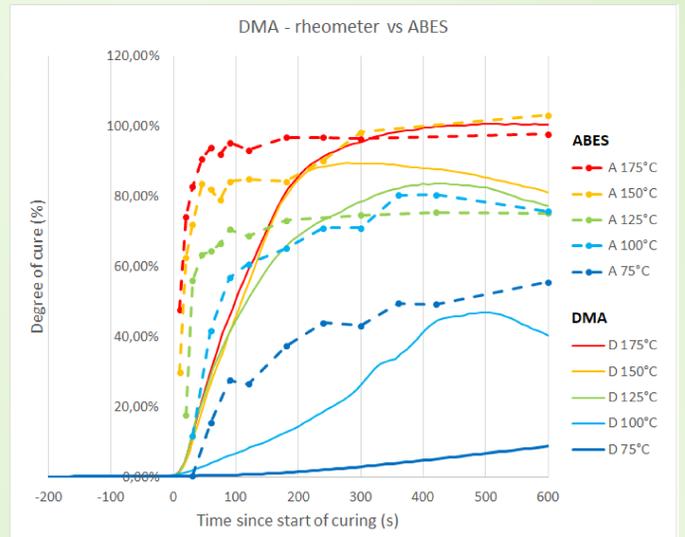
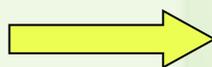
Real time shear tests were made on Automated bonding evaluation system (ABES). Beech (*Fagus sylvatica* L) cut veneer was used for formation of shear lap joints. Observed temperatures were 75 °C, 100 °C, 125 °C, 150 °C and 175 °C.

Conclusion

Curing process of the tannin adhesive determined by DMA resulted in longer curing times compare to those derived from ABES. This was ascribed to differences between methods:

	DMA—rheometer	ABES
Heating time	2-4 min	10-20 s
Pressure	0 (0,5 mm gap)	4 MPa
Adherent	Aluminium	Beech veneer

After taking different heating rates into account, presented methods were more comparable.



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About the author



Jaša Saražin MSc. of forestry, is a doctoral student and researcher at University of Ljubljana, Biotechnical faculty, scientific area Wood and Biocomposites. His research work is focused on bio-based wood adhesives, bonding wood with metal and curing characterisation of adhesives. More about the author you can find at:

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