

ASSESSMENT OF KILN DRIED ACACIA MANGIUM FOR PRODUCTION OF QUALITY

VALUE-ADDED PRODUCTS

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INTRODUCTION

The acacia lumber producer is facing various challenges to consistently produce quality acacia sawn lumber, mainly due to the inherent characteristics of the lumber. In view of the various drying issues faced by the local acacia producer, a public sector and industry collaboration project under the Malaysian government endorsed community innofund (CIF) was initiated to assist the local industry to value-add the acacia timber processing sector via improvement of the drying performance and treatment procedures cater specifically for the timber. This project entailed a medium term in-plant R & D works to optimise the quality of the kiln dried acacia timber produced, which can be subsequently used in the production of laminated truck flooring and other semi-finished wooden joineries or furniture components. A series of commercial drying trials for acacia dimension sawn were conducted in selected timber processing mills in Sabah, Malaysia. After undergone kiln drying, various physical and mechanical properties of the kiln dried acacia lumber were determined.

OBJECTIVES

The specific objective of this paper was to determine the mechanical and delamination properties of the kiln dried *Acacia* lumber produced which can be subsequently used in the production of the laminated truck flooring and other wooden products.

METHODOLOGY

- The commercial drying trial was conducted in a timber processing mill in Kota Kinabalu, Sabah. The optimised drying schedule used was a moisture content based recipe for 30mm-thick *Acacia mangium* sawn timber (Sik *et al.* 2018).
- After undergone kiln drying, the mechanical properties tests such as bending, hardness and shear stress properties were carried out.
- In addition, delamination tests on finger joints for truck flooring were conducted using water boiling soaked test and finger joint bending test.



Preparation of finger-joint profile for acacia sawn



Bonding test¹, dry shear test² and finger-jointed test³ at Wood Lamination Laboratory, FRIM.



Finger joint performance testing at Casco Adhesive (Asia) Testing Laboratory, Singapore

RESULTS & DISCUSSION

Mechanical Properties

The kiln-dried acacia sawn lumber were tested for their mechanical properties according to BS 373 (Anonymous 1957). The tests carried out were bending, hardness and shear properties. Table 1 shows the mean values of modulus of rupture, modulus of elasticity, hardness and shear stress properties of acacia lumber.

Table 1 Mechanical properties of acacia sawn after kiln drying

Mechanical Properties	Mean
Modulus of Rupture, MOR (N/mm ²)	137.48
Modulus of Elasticity, MOE (N/mm ²)	13842.3
Hardness (Load@ 5.6mm, 0.222 inch indentation) kN	5.18
Shear Stress (N/mm ²)	17.121

Delamination Properties

- All test pieces have met the criteria for delamination of finger-joint as specified in JASO M 901 (Anonymous 1985).
- The acacia finger joint test pieces also met the criteria for Young's modulus in bending, with an average bending strength value of 74 MPa.
- In addition, matched-finger joints samples were sent to an independent accredited laboratory of a glue supplier company for interlaboratory cross checks, and all samples met the tests' criteria for both delamination and bending tests.

Table 2 Delamination test on acacia finger joint samples

No	Type of Tests	Wood Lamination Lab, FRIM		Casco Adhesive Lab, Singapore	
		Result	Satisfaction	Result	Satisfaction
1.	Water boiling soaked	0.775%	Met (<10%)	5%	Met
2.	Finger joint bending	74 MPa	Met (60 Mpa)	62.5 MPa	Met
		MOE: 14,281M Pa	Met (>10,000MPa)	NA	NA

CONCLUSION

The findings from this study showed that all samples met the tests criteria for delamination and suitable to be used as laminated truck flooring and other wooden products.

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REFERENCES

- Sik, H.S., How, S.S., Ho, W.M. & Ramzul Iklas, A. L. 2018. Quality throughput of *Acacia mangium* lumber from industrial kiln. *Journal of Agriculture, Forestry and Plantation Vol. 7*, December 2018. Pp 79-82. ISSN 2462-1757
- Anonymous. 1957. *BS 373. Method of Testing Small Clear Specimens of Timber*. British Standards Institution, London.
- Anonymous.1985. *JASO M 901-85. Wooden Parts for the Cargo Bed of Motor Trucks*.