

Basic and Grade Stress for Some Timber in Sarawak

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Abstract—Strength properties' tests are conducted in the small clear sample. This paper aim to acquire the basic and grade stresses of some fast growing species thus identifies its strength group. Thus, the information of wood properties from different species and condition are acquired from strength property's test. The required information namely, bending parallel to the grain, compression stress parallel to grain, shear parallel to grain and modulus of elasticity. The condition of the trees which is referred to green and air-dry condition. Three different species which are referred to exotic species of *Acacia mangium* and indigenous species of Aras. The results from the study indicated that, *Acacia mangium* classified under the strength group SG5, whilst Aras was classified under the strength group SG7. The timber is of medium density Light Hardwood ranging from 0.37-0.52g/cm³ air-dry condition.

Keywords: Bending parallel to the grain, compression stress parallel to grain, shear parallel to grain, modulus of elasticity.

I. INTRODUCTION

Although the density of timber is relatively reflected the strength of the timber, but it should not be the definite measurement of its strength. It had been understood that timber is homogenous material thus some physical testing had to be conducted to reveal and confirmed the timber strength group as identified from its density. The most suitable sample to be tested that had been suggested by using the small clear sample which is the defect free. [4]. Therefore, the strength properties of some species can be compared and to be concluded by identified its strength group classification on the species that base on Malaysian Standard MS544: Part 2 requirements. The strength group classification on the selected species for this study was subject to the testing results that acquired from compression parallel to grain test, shear parallel to grain test, bending parallel to grain and modulus of elasticity. The strength group classification was conducted in two conditions at green and air-dry. Classification on the strength group on the species was depended on the grade stresses results, i.e. grade select, grade standard and grade common. The strength groups can be classified into seven categories, which base on the strength species namely SG1, SG2, SG3, SG4, SG5, SG6 and SG7.

In timber engineering practice, the ultimate stresses obtained from tests are reduced by applying arbitrary factors [6] to obtain what is called working stresses or permissible stress. These arbitrary reduction factors account for variability of timber duration, and conditions offloading, and factor of safety [4].

II. EXPERIMENTAL METHODS

Preparation of specimen

Three timber species namely *Acacia mangium* and Aras were collected from Sabal Reforestation Plot are used in this study. Sampling of test samples was made throughout the whole length of the tree. The logs were then ripped into half through the pith to obtain the flicthes. The flicthes were planed and machined to 20x20mm for static bending tests. The sticks were visually grade, and only defect free green as well as air-dry samples are cut into specified length and tested. The green condition samples were first to be tested whilst for air-dry condition samples stacked properly for air-drying process. This air-dry process is depending on the type of sample, and this process can be more than nine months. A total of 190 timber samples were used for the bending tests both in each testing condition.

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