CHAPTER FOUR

4.0 Result and Discussions

4.1 Flexural Test Strength

4.1.1 Flexural Strength Test on Sandal Wood Reinforced Concrete Slab

Table 4.1 shows experimental load results of the central point flexural test on the sandal wood reinforced concrete slabs. The flexural strength of the sandal wood reinforced slabs (CRS) at 28 days strength was from 4.51 N/mm^2 to 8.47 N/mm^2 with increase in the percentage of teak rebar from 1% to 4%.

Table 4.1 Flexural Strength (Experimental Load) Result of Sandal wood Rebar Slab

28 days Curing						
Label		Density (kg/m^3)	Failure load (N)	Deflection at Peak (mm)	Flexural Strength (N/mm^2)	Mode of Failure
1ORS	Minimum	2406.35	6000	3.0	3.73	One visible cracks were seen and failure is in tension.
	Maximum	2411.22	8500	4.8	5.29	
	Mean	**2408.79**	**7250**	**3.9**	**4.51**	
2ORS	Minimum	2095.24	6800	4.2	4.23	One visible cracks were seen and failure is in tension.
	Maximum	2100.33	9000	6.0	5.6	
	Mean	**2097.79**	**7900**	**5.1**	**4.92**	
3ORS	Minimum	2100.34	6900	3.0	4.29	Two visible cracks were seen and failure is in tension.
	Maximum	2180.77	9700	5.0	6.04	
	Mean	**2140.56**	**8300**	**4.0**	**5.17**	
4ORS	Minimum	2308.66	13800	6.8	8.38	Two visible cracks were seen and
	Maximum	2350.66	14300	7.5	8.56	

	Mean	**2329.66**	**14050**	**7.15**	**8.47**	failure is in tension.

4.1.2 Flexural Strength on Steel Reinforced Concrete Slab

Table 4.2 shows experimental load results of the central point flexural test on the 0.8 and 1.2% steel reinforced concrete slabs. The failure load of the steel reinforced slabs at 28 days strength was from 17500 N to 19600 N. From the failure loads, it was observed that the higher the percentage of steel, the higher the load required to rupture the slabs. Also deflection increased with increase in the percentage of Steel reinforcement from 15.60 mm to 18.30 mm. The flexural strength of the slabs also increased from 10.89 N/mm^2 to 12.19 N/mm^2 with increase in the percentage of Steel reinforcement.

Table 4.13: Flexural Strength Test (Experimental Load) Result of Steel Reinf. Slab

Label		Density (kg/m^3)	Failure load (N)	Deflection at Peak (mm)	Flexural Strength (N/mm^2)	Mode of Failure
SRS	Minimum	2406.35	17500	15.60	10.89	One visible cracks were seen and failure is in tension
	Maximum	2411.22	19600	18.30	12.19	
	Mean	**2408.79**	**18550**	**27.45**	**11.54**	

4.3 Mechanical Properties Test Results

4.3.1 Bending Strength Parallel to Grain

The bending strength parallel to grain test results of Opan timber specie was shown in Table 4.3. The modulus of rupture was obtained at 16.20% M.C. The values of the mean failure stress, standard deviation and the coefficient of variation were 39.15 N/mm^2, 10.26 N/mm^2 and 26.21% respectively. Based on the data obtained from the test, the true mean modulus of rupture at failure lie between 34.65 N/mm^2 to 43.65 N/mm^2 at 95% confidence limit and 33.25 N/mm^2 to 45.05 N/mm^2 at 99% confidence limit. The characteristic experimental values were adjusted from 16.20% M.C to 39.92 N/mm^2 and 30.52 N/mm^2 at 12% and 18% moisture

content. The basic and 80% grade stress obtained from the test are 2.94 N/mm^2 and 2.35 N/mm^2 respectively.

Table 4.6: Mechanical Properties of Opan Timber Species

Opan timber ***(Lannea Schimperi***	MOR (N/mm^2)	Local M.O.E (N/mm^2)	Apparent M.O.E (N/mm^2)	**Comp.** Par. To grain (N/mm^2)	Comp. Per. To grain (N/mm^2)	Tens. Par. to grain (N/mm^2)
Mean Failure	39.15	4783.89	69.64	13.94	9.92	32.54
Std. Deviatio	10.26	896.53	16.65	1.41	1.97	3.59
Coef. of Var.	26.21	18.74	23.91	10.13	14.15	25.73
Lower Conf. Limit (95%)	34.65≤x ≤43.65	4393.89≤x≤5173. 89	62.34≤x≤76. 94	13.32 ≤x≤14.56	9.06 ≤x≤10.78	30.94≤x≤34. 14
Upper Conf. Limit (99%)	33.25≤x ≤45.05	4263.89≤x≤5303. 89	60.04 ≤x≤79.24	13.13≤x≤14. 75	8.82≤x≤11. 02	30.44≤x≤34. 64
Shear Modulu			0.85			
12% M.C	39.92	4830.77	70.32	20.43	10.16	33.34
18% M.C	30.52	4256.71	61.97	14.45	7.19	23.58
Basic Stress	2.94	3789.61	53.30	7.98	6.16	6.76
Grade Stress 80	2.35	3031.69	42.64	6.38	4.93	5.41

4.3.2 Local Modulus of Elasticity

The local modulus of elasticity results of Opan timber specie was shown in Table 4.3. The local modulus of elasticity was obtained at 16.20% M.C. The values of the mean failure stress, standard deviation and the coefficient of variation were 4783.89 N/mm^2, 896.53 N/mm^2 and 18.74%. Based on the data obtained from the test, the true mean local modulus of elasticity at failure lie between 4393.89 N/mm^2 to 5173.89 N/mm^2 at 95% confidence limit and 4263.89 N/mm^2 to 5303.89 N/mm^2 at 99% confidence limit. The characteristic experimental values were adjusted from 16.20% M.C to 4830.77 N/mm^2 and 4256.71 N/mm^2 at 12% and 18% moisture content. The basic and 80% grade stress obtained from the test are 3789.61 N/mm^2 and 3031.69 N/mm^2 respectively.

4.3.3 Apparent Modulus of Elasticity

The apparent modulus of elasticity results of Opan timber specie was shown in Table 4.3. The apparent modulus of elasticity was obtained at 12.19% M.C. The values of the mean failure stress, standard deviation and the coefficient of variation were 69.64 N/mm^2, 16.65 N/mm^2 and 23.91%. The shear modulus computed from this apparent modulus of elasticity using equation 3.xx was of 0.85 N/mm^2. Based on the data obtained from the test, the true apparent modulus of elasticity at failure lie between 62.34 N/mm^2 to 76.94 N/mm^2 at 95% confidence limit and 60.04 N/mm^2 to 79.24 N/mm^2 at 99% confidence limit. The characteristic experimental values were adjusted from12.19% M.C to 70.32 N/mm^2 and 61.97 N/mm^2 at 12% and 18% moisture content. The basic and 80% grade stress obtained from the test are 53.30 N/mm^2 and 42.64 N/mm^2 respectively.

4.3.4 Compressive Strength Parallel to Grain

The compressive strength parallel to grain results of Opan timber specie was shown in Table 4.3. The compressive strength parallel to grain was obtained at 12.13% M.C. The values of the mean failure stress, standard deviation and the coefficient of variation were 13.94 N/mm^2, 1.41 N/mm^2 and 10.13%. Based on the data obtained from the test, the true mean compressive strength parallel to grain at failure lie between 13.32 N/mm^2 to 14.56 N/mm^2 at 95% confidence limit and 13.13 N/mm^2 to 14.75 N/mm^2 at 99% confidence limit. The characteristic experimental values were adjusted from 12.13% M.C to 20.43 N/mm^2 and 14.45 N/mm^2 at

12% and 18% moisture content. The basic and 80% grade stress obtained from the test are 6.16 N/mm^2 and 4.93 N/mm^2 respectively.

4.3.5 Compressive Strength Perpendicular to Grain

The compressive strength perpendicular to grain results of Opan timber specie was shown in Table 4.3. The compressive strength perpendicular to grain value was obtained at 10.52% M.C. The values of the mean failure stress, standard deviation and the coefficient of variation were 9.92 N/mm^2, 1.97 N/mm^2 and 14.15%. Based on the data obtained from the test, the true mean compressive strength parallel to grain at failure lie between 9.06 N/mm^2 to 10.78 N/mm^2 at 95% confidence limit and 8.82 N/mm^2 to 11.02 N/mm^2 at 99% confidence limit. The characteristic experimental values were adjusted from 10.52% M.C to 10.16 N/mm^2 and 7.19 N/mm^2 at 12% and 18% moisture content. The basic and 80% grade stress obtained from the test are 6.16 N/mm^2 and 4.93 N/mm^2 respectively.

4.3.6 Tensile Strength Parallel to Grain

The tensile strength parallel to grain results of Opan timber specie was shown in Table 4.3. The tensile strength parallel to grain value was obtained at 11.43% M.C. The values of the mean failure stress, standard deviation and the coefficient of variation were 32.54 N/mm^2, 3.59 N/mm^2 and 25.73%. Based on the data obtained from the test, the true mean compressive strength parallel to grain at failure lie between 30.94 N/mm^2 to 34.14 N/mm^2 at 95% confidence limit and 30.44 N/mm^2 to 34.64 N/mm^2 at 99% confidence limit. The characteristic experimental values were adjusted from 11.43% M.C to 33.34 N/mm^2 and 23.58 N/mm^2 at 12% and 18% moisture content. The basic and 80% grade stress obtained from the test are 6.76 N/mm^2 and 5.41 N/mm^2 respectively.