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## LAMPIRAN

### Lampiran 1. Sifat fisik dan mekanis

*Nilai kadar air dan kerapatan*

Jenis Kayu	Variasi Suhu	Kadar Air	Kerapatan
		(%)	(g/cm <sup>3</sup> )
Gmelina	Kontrol	16.09	0.45
	100°C	13.16	0.40
	125°C	13.09	0.43
	150°C	12.69	0.41
Jabon Merah	Kontrol	16.26	0.47
	100°C	14.14	0.47
	125°C	15.55	0.51
	150°C	12.95	0.41

*Nilai keteguhan rekat, MOE, MOR dan Delaminasi*

Jenis Kayu	Variasi Suhu	Keteguhan Rekat	MOR	MOE	Delaminasi
		(%)	(g/cm <sup>3</sup> )	(g/cm <sup>3</sup> )	(%)
Gmelina	Kontrol	44.41	520.70	53427.80	0.49
	100°C	29.75	362.17	46799.18	2.06
	125°C	33.26	422.20	43711.54	0.26
	150°C	38.85	342.34	36111.79	7.42
Jabon Merah	Kontrol	56.39	556.58	60108.82	23.83
	100°C	58.92	526.79	49746.12	17.75
	125°C	62.72	586.82	42939.54	11.19
	150°C	62.79	507.13	49945.05	30.57

**Lampiran 2.** Tabel analisis ragam pengaruh variasi suhu terhadap kadar air laminasi kayu gmelina dan jabon merah

**Tests of Between-Subjects Effects**

Dependent Variable: Kadar\_Air

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	70.236 <sup>a</sup>	7	10.034	17.486	.000
Intercept	7974.411	1	7974.411	13897.333	.000
Jeni_Kayu	5.256	1	5.256	9.160	.005
Suhu	61.983	3	20.661	36.007	.000
Jeni_Kayu * Suhu	2.996	3	.999	1.741	.178
Error	18.362	32	.574		
Total	8063.009	40			
Corrected Total	88.598	39			

a. R Squared = .793 (Adjusted R Squared = .747)

**Multiple Comparisons**

Dependent Variable: Kadar\_Air

Tukey HSD

(I) Suhu	(J) Suhu	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
W1	W2	2.5230*	.33877	.000	1.6052	3.4408
	W3	2.3320*	.33877	.000	1.4142	3.2498
	W4	3.3510*	.33877	.000	2.4332	4.2688
W2	W1	-2.5230*	.33877	.000	-3.4408	-1.6052
	W3	-.1910	.33877	.942	-1.1088	.7268
	W4	.8280	.33877	.089	-.0898	1.7458
W3	W1	-2.3320*	.33877	.000	-3.2498	-1.4142
	W2	.1910	.33877	.942	-.7268	1.1088
	W4	1.0190*	.33877	.025	.1012	1.9368
W4	W1	-3.3510*	.33877	.000	-4.2688	-2.4332
	W2	-.8280	.33877	.089	-1.7458	.0898
	W3	-1.0190*	.33877	.025	-1.9368	-.1012

Based on observed means.

The error term is Mean Square(Error) = .574.

\*. The mean difference is significant at the 0.05 level.

**Kadar\_Air**

Tukey HSD<sup>a,b</sup>

Suhu	N	Subset		
		1	2	3
W4	10	12.8200		
W2	10	13.6480	13.6480	
W3	10		13.8390	
W1	10			16.1710
Sig.		.089	.942	1.000

Means for groups in homogeneous subsets are displayed.

Based on observed means.

The error term is Mean Square(Error) = .574.

a. Uses Harmonic Mean Sample Size = 10.000.

b. Alpha = 0.05.



**Lampiran 3.** Tabel analisis ragam pengaruh variasi suhu terhadap kerapatan laminasi kayu gmelina dan jabon merah

**Tests of Between-Subjects Effects**

Dependent Variable: Kerapatan

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.043 <sup>a</sup>	7	.006	2.992	.016
Intercept	8.100	1	8.100	3963.303	.000
Jeni_Kayu	.016	1	.016	7.829	.009
Suhu	.018	3	.006	2.926	.049
Jeni_Kayu * Suhu	.009	3	.003	1.445	.248
Error	.065	32	.002		
Total	8.208	40			
Corrected Total	.108	39			

a. R Squared = .396 (Adjusted R Squared = .263)

**Multiple Comparisons**

Dependent Variable: Kerapatan

Tukey HSD

(I) Suhu	(J) Suhu	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
W1	W2	.0340	.02022	.350	-.0208	.0888
	W3	.0010	.02022	1.000	-.0538	.0558
	W4	.0490	.02022	.093	-.0058	.1038
W2	W1	-.0340	.02022	.350	-.0888	.0208
	W3	-.0330	.02022	.376	-.0878	.0218
	W4	.0150	.02022	.879	-.0398	.0698
W3	W1	-.0010	.02022	1.000	-.0558	.0538
	W2	.0330	.02022	.376	-.0218	.0878
	W4	.0480	.02022	.103	-.0068	.1028
W4	W1	-.0490	.02022	.093	-.1038	.0058
	W2	-.0150	.02022	.879	-.0698	.0398
	W3	-.0480	.02022	.103	-.1028	.0068

Based on observed means.

The error term is Mean Square(Error) = .002.

**Kerapatan**

Tukey HSD<sup>a,b</sup>

Suhu	N	Subset 1
W4	10	.4220
W2	10	.4370
W3	10	.4700
W1	10	.4710
Sig.		.093

Means for groups in homogeneous subsets are displayed.

Based on observed means.  
The error term is Mean Square(Error) = .002.

a. Uses Harmonic Mean Sample Size = 10.000.

b. Alpha = 0.05.

**Lampiran 4.** Tabel analisis ragam pengaruh variasi suhu terhadap uji delaminasi laminasi kayu gmelina dan jabon merah

**Tests of Between-Subjects Effects**

Dependent Variable: Delaminasi

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4540.185 <sup>a</sup>	7	648.598	2.514	.035
Intercept	5473.728	1	5473.728	21.217	.000
Jeni_Kayu	3341.218	1	3341.218	12.951	.001
Suhu	924.040	3	308.013	1.194	.328
Jeni_Kayu * Suhu	274.926	3	91.642	.355	.786
Error	8255.665	32	257.990		
Total	18269.578	40			
Corrected Total	12795.850	39			

a. R Squared = .355 (Adjusted R Squared = .214)

**Multiple Comparisons**

Dependent Variable: Delaminasi

Tukey HSD

(I) Suhu	(J) Suhu	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
W1	W2	2.2590	7.18317	.989	-17.2028	21.7208
	W3	6.4370	7.18317	.807	-13.0248	25.8988
	W4	-6.8360	7.18317	.777	-26.2978	12.6258
W2	W1	-2.2590	7.18317	.989	-21.7208	17.2028
	W3	4.1780	7.18317	.937	-15.2838	23.6398
	W4	-9.0950	7.18317	.591	-28.5568	10.3668
W3	W1	-6.4370	7.18317	.807	-25.8988	13.0248
	W2	-4.1780	7.18317	.937	-23.6398	15.2838
	W4	-13.2730	7.18317	.270	-32.7348	6.1888
W4	W1	6.8360	7.18317	.777	-12.6258	26.2978
	W2	9.0950	7.18317	.591	-10.3668	28.5568
	W3	13.2730	7.18317	.270	-6.1888	32.7348

Based on observed means.

The error term is Mean Square(Error) = 257.990.

**Lampiran 5.** Tabel analisis ragam pengaruh variasi suhu terhadap keteguhan rekat laminasi kayu gmelina dan jabon merah

**Tests of Between-Subjects Effects**

Dependent Variable: Keteguhan\_Rekat

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6360.092 <sup>a</sup>	7	908.585	8.370	.000
Intercept	93693.688	1	93693.688	863.077	.000
Jeni_Kayu	5597.719	1	5597.719	51.564	.000
Suhu	259.188	3	86.396	.796	.505
Jeni_Kayu * Suhu	503.185	3	167.728	1.545	.222
Error	3473.847	32	108.558		
Total	103527.627	40			
Corrected Total	9833.939	39			

a. R Squared = .647 (Adjusted R Squared = .569)

### Multiple Comparisons

Dependent Variable: Keteguhan\_Rekat

Tukey HSD

(I) Suhu	(J) Suhu	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
W1	W2	5.9850	4.65956	.579	-6.6394	18.6094
	W3	2.4380	4.65956	.953	-10.1864	15.0624
	W4	-.4180	4.65956	1.000	-13.0424	12.2064
W2	W1	-5.9850	4.65956	.579	-18.6094	6.6394
	W3	-3.5470	4.65956	.871	-16.1714	9.0774
	W4	-6.4030	4.65956	.524	-19.0274	6.2214
W3	W1	-2.4380	4.65956	.953	-15.0624	10.1864
	W2	3.5470	4.65956	.871	-9.0774	16.1714
	W4	-2.8560	4.65956	.927	-15.4804	9.7684
W4	W1	.4180	4.65956	1.000	-12.2064	13.0424
	W2	6.4030	4.65956	.524	-6.2214	19.0274
	W3	2.8560	4.65956	.927	-9.7684	15.4804

Based on observed means.

The error term is Mean Square(Error) = 108.558.

### Lampiran 6. Tabel analisis ragam pengaruh variasi suhu terhadap MOE laminasi kayu gmelina dan jabon merah

#### Tests of Between-Subjects Effects

Dependent Variable: MOE

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1847521392 <sup>a</sup>	7	263931627.4	1.414	.234
Intercept	9.158E+10	1	9.158E+10	490.740	.000
Jeni_Kayu	321750326.7	1	321750326.7	1.724	.199
Suhu	1234332722	3	411444240.7	2.205	.107
Jeni_Kayu * Suhu	291438342.9	3	97146114.30	.521	.671
Error	5971713975	32	186616061.7		
Total	9.940E+10	40			
Corrected Total	7819235367	39			

a. R Squared = .236 (Adjusted R Squared = .069)

**Lampiran 7.** Tabel analisis ragam pengaruh variasi suhu terhadap MOR laminasi kayu gmelina dan jabon merah

**Tests of Between-Subjects Effects**

Dependent Variable: MOR

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	290020.220 <sup>a</sup>	7	41431.460	4.684	.001
Intercept	9142848.937	1	9142848.937	1033.679	.000
Jeni_Kayu	175513.816	1	175513.816	19.843	.000
Suhu	83402.985	3	27800.995	3.143	.039
Jeni_Kayu * Suhu	31103.418	3	10367.806	1.172	.336
Error	283038.779	32	8844.962		
Total	9715907.936	40			
Corrected Total	573058.999	39			

a. R Squared = .506 (Adjusted R Squared = .398)

**Multiple Comparisons**

Dependent Variable: MOR

Tukey HSD

(I) Suhu	(J) Suhu	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
W1	W2	94.1611	42.05939	.135	-19.7930	208.1152
	W3	34.1343	42.05939	.849	-79.8198	148.0884
	W4	113.9026	42.05939	.050	-.0515	227.8567
W2	W1	-94.1611	42.05939	.135	-208.1152	19.7930
	W3	-60.0268	42.05939	.492	-173.9809	53.9273
	W4	19.7415	42.05939	.965	-94.2126	133.6956
W3	W1	-34.1343	42.05939	.849	-148.0884	79.8198
	W2	60.0268	42.05939	.492	-53.9273	173.9809
	W4	79.7683	42.05939	.250	-34.1858	193.7224
W4	W1	-113.9026	42.05939	.050	-227.8567	.0515
	W2	-19.7415	42.05939	.965	-133.6956	94.2126
	W3	-79.7683	42.05939	.250	-193.7224	34.1858

Based on observed means.

The error term is Mean Square(Error) = 8844.962.

**MOR**

Tukey HSD<sup>a,b</sup>

Suhu	N	Subset
		1
W4	10	424.7381
W2	10	444.4796
W3	10	504.5064
W1	10	538.6407
Sig.		.050

Means for groups in homogeneous subsets are displayed.

Based on observed means.

The error term is Mean Square(Error) = 8844.962.

a. Uses Harmonic Mean Sample Size = 10.000.

b. Alpha = 0.05.

**Lampiran 8.** Dokumentasi penelitian

*Proses persiapan lamina*



Kayu berbentuk balok



Proses konversi balok menjadi lamina



Lembaran lamina



Pengolahan lamina

*Proses pemberian perlakuan panas*



Proses perlakuan panas



Setelah perlakuan panas



Proses pengondisian

*Proses pembuatan balok laminasi*



Proses pemberian perekat



Proses pemberian perekat



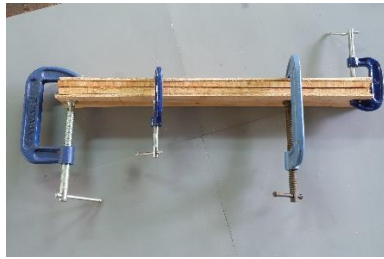
Setelah dilaburi perekat



Sebelum pengempaan



Proses pengempaan



Proses Klem



Balok Laminasi

*Proses pengujian balok laminasi*



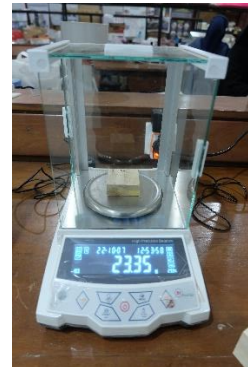
Proses pengujian kadar air



Proses pengujian kadar air



Proses pengujian kerapatan



Proses pengujian kerapatan



Proses pengujian delaminasi



Proses pengujian delaminasi (Sebelum)



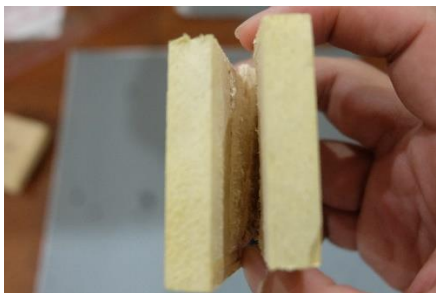
Proses pengujian delaminasi (Setelah)



Sampel pengujian keteguhan rekat



Proses pengujian keteguhan rekat



Kerusakan setelah pengujian keteguhan rekat



Sampel pengujian MOE & MOR



Proses pengujian MOE & MOR





Kerusakan setelah pengujian MOE & MOR