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LAMPIRAN

Lampiran 1. Perhitungan data primer

Tabel 1. Dimensi

Sampel	Sisi (mm)	Ketebalan (mm)
Control	23,80	3,70
Blok 1		
A1B1	23,80	3,90
A1B2	23,80	4,02
A1B3	23,80	4,70
A2B1	23,80	4,02
A2B2	23,80	4,74
A2B3	23,80	5,16
A3B1	23,80	4,12
A3B2	23,80	4,72
A3B1	23,80	5,52
Blok 2		
A1B1	23,80	4,02
A1B2	23,80	4,31
A1B3	23,80	4,95
A2B1	23,80	4,17
A2B2	23,80	4,44
A2B3	23,80	5,45
A3B1	23,80	4,16
A3B2	23,80	4,50
A3B1	23,80	5,22

Tabel 2. Kedap air

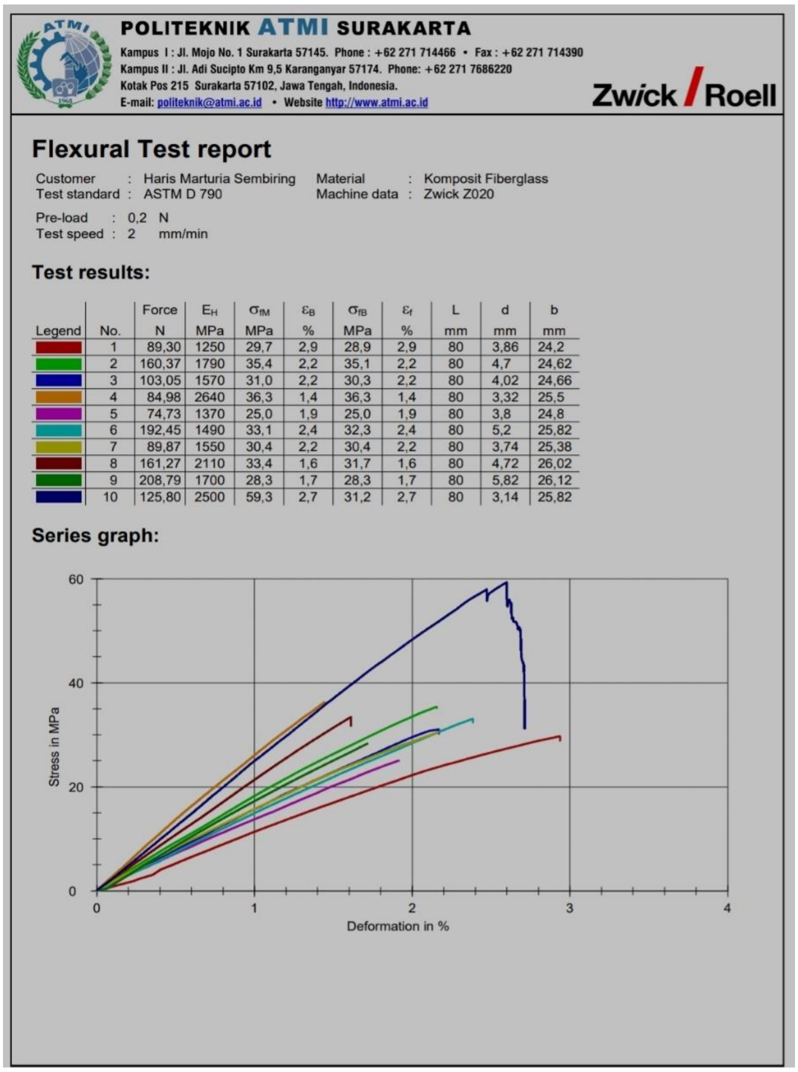
Sampel	Berat awal kapas (b. aw) (gram)	Berat akhir kapas (b. ak) (gram)	B. Ak – B. Aw (gram)
Control	1,1852	1,1896	0,0044
Blok 1			
A1B1	1,1712	1,1723	0,0011
A1B2	1,1784	1,1798	0,0014
A1B3	1,1769	1,1791	0,0022
A2B1	1,1731	1,1744	0,0013
A2B2	1,1807	1,1826	0,0019
A2B3	1,1780	1,1806	0,0026
A3B1	1,1806	1,1820	0,0014
A3B2	1,1831	1,1858	0,0027
A3B1	1,1797	1,1831	0,0034
Blok 2			
A1B1	1,1658	1,1661	0,0003
A1B2	1,1637	1,1644	0,0007
A1B3	1,1566	1,1579	0,0013
A2B1	1,1619	1,1624	0,0005
A2B2	1,1599	1,1609	0,001
A2B3	1,1580	1,1596	0,0016
A3B1	1,1593	1,1601	0,0008
A3B2	1,1585	1,1597	0,0012
A3B1	1,1607	1,1626	0,0019

Tabel 3. Porositas

Sampel	Berat awal (gram)	Berat akhir (gram)	Porositas (%)
Control	8,3589	8,4755	1,3949
Blok 1			
A1B1	9,9177	10,0579	1,4136
A1B2	11,7816	11,9565	1,4845
A1B3	12,2989	12,6885	3,1678
A2B1	10,3171	10,5724	2,4745
A2B2	10,4535	10,7885	3,2047
A2B3	13,5979	14,0965	3,6667
A3B1	11,5218	11,7328	1,8313
A3B2	13,5699	13,8336	1,9433
A3B1	14,7037	15,0667	2,4688
Blok 2			
A1B1	10,4792	10,7405	2,4935
A1B2	11,2249	11,5245	2,6691
A1B3	10,8697	11,2591	3,5824
A2B1	10,0199	10,2751	2,5469
A2B2	11,2875	11,6172	2,9209
A2B3	11,9179	12,3926	3,9831
A3B1	10,0584	10,3304	2,7042
A3B2	11,5869	11,9435	3,0776
A3B1	12,5941	12,9876	3,1245

Tabel 4. Uji *bending*

Sampel	L (mm)	d (mm)	b (mm)	Kuat beban (N)	s_{fM} (MPa)	s_{fB} (MPa)	s_{fM} (MPa/mm)	s_{fB} (MPa/mm)
A1B1	80	3,86	24,2	89,2977	29,7188	28,8682	7,6992	7,4788
A1B2	80	4,02	24,66	103,0507	31,0304	30,2595	7,7190	7,5272
A1B3	80	4,7	24,62	160,3717	35,3855	35,1127	7,5288	7,4708
A2B1	80	3,32	25,5	84,9755	36,2793	36,2793	10,9275	10,9275
A2B2	80	3,8	24,8	74,7272	25,0404	25,0404	6,5896	6,5896
A2B3	80	5,2	25,82	192,4499	33,0778	32,3490	6,3611	6,2210
A3B1	80	3,74	25,38	89,8701	30,3782	30,3782	8,1225	8,1225
A3B2	80	4,72	26,02	161,2684	33,3841	31,7192	7,0729	6,7202
A3B3	80	5,82	26,12	208,7929	28,3190	28,3190	4,8658	4,8658
control	80	3,14	25,82	125,8008	59,2992	31,2200	18,8851	9,9427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Zwick Roell

Flexural Test report

Customer : Haris Marturia Sembiring
Test standard : ASTM D 790
Material : Komposit Fiberglass
Machine data : Zwick Z020

Pre-load : 0,2 N
Test speed : 2 mm/min

Test results:

Legend	No.	Force N	E_H MPa	σ_{fM} MPa	ε_B %	σ_{fB} MPa	ε_f %	L mm	d mm	b mm
	1	89,30	1250	29,7	2,9	28,9	2,9	80	3,86	24,2
	2	160,37	1790	35,4	2,2	35,1	2,2	80	4,7	24,62
	3	103,05	1570	31,0	2,2	30,3	2,2	80	4,02	24,66
	4	84,98	2640	36,3	1,4	36,3	1,4	80	3,32	25,5
	5	74,73	1370	25,0	1,9	25,0	1,9	80	3,8	24,8
	6	192,45	1490	33,1	2,4	32,3	2,4	80	5,2	25,82
	7	89,87	1550	30,4	2,2	30,4	2,2	80	3,74	25,38
	8	161,27	2110	33,4	1,6	31,7	1,6	80	4,72	26,02
	9	208,79	1700	28,3	1,7	28,3	1,7	80	5,82	26,12
	10	125,80	2500	59,3	2,7	31,2	2,7	80	3,14	25,82

Series graph:

Lampiran 2. Analisa Statistik Pengamatan

1. Dimensi

Two way anova

Tests of Between-Subjects Effects

Dependent Variable: dimensi

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3.930[a]	8	.491	16.265	.000
Intercept	338.171	1	338.171	11197.711	.000
katalis	.403	2	.201	6.668	.020
fiber	3.244	2	1.622	53.702	.000
katalis * fiber	.092	4	.023	.763	.578
Error	.242	8	.030		
Total	364.075	17			
Corrected Total	4.171	16			

a. R Squared = ,942 (Adjusted R Squared = ,884)

Duncan katalis

dimensi

	katalis	N	Subset 1	Subset 2
Duncan[a,b,c]	0,5	5	4.400000	
	0,75	6		4.663333
	1	6		4.706667
	Sig.		1.000	.687

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = ,030.

a. Uses Harmonic Mean Sample Size = 5,625.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

c. Alpha = ,05.

Duncan fiber kelapa sawit

dimensi

	fiber	N	Subset		
			1	2	3
Duncan[a,b,c]	7,5	5	4.098000		
	10	6		4.455000	
	12,5	6			5.166667
	Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = ,030.

a. Uses Harmonic Mean Sample Size = 5,625.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

c. Alpha = ,05.

Uji T

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
dimensi	18	4.562222	.5221850	.1230802

One-Sample Test

	Test Value = 3.7					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
dimensi	7.005	17	.000	.8622222	.602546	1.121899

2. Kedap air

Two way anova

Tests of Between-Subjects Effects

Dependent Variable: kedap_air

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6.756E-6[a]	8	8.445E-7	1.569	.269
Intercept	3.511E-5	1	3.511E-5	65.250	.000
katalis	1.939E-6	2	9.696E-7	1.802	.226
fiber	5.067E-6	2	2.533E-6	4.708	.045
katalis * fiber	7.449E-8	4	1.862E-8	.035	.997
Error	4.305E-6	8	5.381E-7		
Total	5.144E-5	17			
Corrected Total	1.106E-5	16			

a. R Squared = ,611 (Adjusted R Squared = ,222)

Duncan fiber kelapa sawit

kedap_air

	fiber	N	Subset 1	Subset 2
Duncan[a,b,c]	7,5	5	.000860	
	10	6	.001483	.001483
	12,5	6		.002167
	Sig.		.192	.157

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 5,38E-007.

a. Uses Harmonic Mean Sample Size = 5,625.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

c. Alpha = ,05.

Uji T

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
kedap_air	18	.001517	.0008133	.0001917

One-Sample Test

	Test Value = 0.0044					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
kedap_air	-15.041	17	.000	-.0028833	-.003288	-.002479

3. Porositas

Two way anova

Tests of Between-Subjects Effects

Dependent Variable: porositas

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4.938[a]	8	.617	2.330	.126
Intercept	124.188	1	124.188	468.678	.000
katalis	1.215	2	.607	2.293	.163
fiber	2.711	2	1.355	5.115	.037
katalis * fiber	.825	4	.206	.778	.570
Error	2.120	8	.265		
Total	138.907	17			
Corrected Total	7.058	16			

a. R Squared = ,700 (Adjusted R Squared = ,399)

Duncan fiber kelapa sawit

porositas

	fiber	N	Subset	
			1	2
Duncan[a,b,c]	7,5	5	2.410080	
	10	6	2.550017	
	12,5	6		3.332217
	Sig.		.661	1.000

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = ,265.

a. Uses Harmonic Mean Sample Size = 5,625.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

c. Alpha = ,05.

Uji T

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
porositas	18	2.708744	.7208697	.1699106

One-Sample Test

	Test Value = 1.3949					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
porositas	7.733	17	.000	1.3138444	.955364	1.672325

4. Uji *bending*

Two way anova kuat beban

Tests of Between-Subjects Effects

Dependent Variable: force

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	42162.218[a]	8	5270.277	1.186E+12	.000
Intercept	301503.873	1	301503.873	6.784E+13	.000
katalis	5135.748	2	2567.874	5.778E+11	.000
fiber	31919.154	2	15959.577	3.591E+12	.000
katalis * fiber	5107.316	4	1276.829	2.873E+11	.000
Error	4.000E-8	9	4.444E-9		
Total	343666.090	18			
Corrected Total	42162.218	17			

a. R Squared = 1,000 (Adjusted R Squared = 1,000)

Uji *duncan*

force

Duncan[a,b]

katalis	N	Subset 1	2	3
0,75	6	117.384133		
0,5	6		117.573317	
1	6			153.310417
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 4,44E-009.

a. Uses Harmonic Mean Sample Size = 6,000.

b. Alpha = ,05.

force

Duncan[a,b]

fiber	N	Subset 1	2	3
7,5	6	88.047717		
10	6		113.015367	
12,5	6			187.204783
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 4,44E-009.

a. Uses Harmonic Mean Sample Size = 6,000.

b. Alpha = ,05.

Uji T

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
force	18	129.422622	49.8009080	11.7381866

One-Sample Test

	Test Value = 125.8008					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
force	.309	17	.761	3.6218222	-21.143587	28.387231

Two way anova bending (fM)

Tests of Between-Subjects Effects

Dependent Variable: Uji_Bending_fM

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	42.859[a]	8	5.357	292218127.4	.000
Intercept	994.174	1	994.174	5.423E+10	.000
katalis	5.281	2	2.640	144024177.4	.000
fiber	22.134	2	11.067	603656638.6	.000
katalis * fiber	15.444	4	3.861	210595846.7	.000
Error	1.650E-7	9	1.833E-8		
Total	1037.033	18			
Corrected Total	42.859	17			

a. R Squared = 1,000 (Adjusted R Squared = 1,000)

Duncan katalis (fM)

Uji_Bending_fM

Duncan[a,b]

katalis	N	Subset 1	2	3
1	6	6.687067		
0,5	6		7.649000	
0,75	6			7.959383
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 1,83E-008.

a. Uses Harmonic Mean Sample Size = 6,000.

b. Alpha = ,05.

Duncan fiber kelapa sawit (fM)

Uji_Bending_fM

Duncan[a,b]

fiber	N	Subset 1	Subset 2	Subset 3
12,5	6	6.251900		
10	6		7.127150	
7,5	6			8.916400
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 1,83E-008.

a. Uses Harmonic Mean Sample Size = 6,000.

b. Alpha = ,05.

Two way anova bending (fB)

Tests of Between-Subjects Effects

Dependent Variable: Uji_Bending_fB

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	43.746[a]	8	5.468	273411074.7	.000
Intercept	965.754	1	965.754	4.829E+10	.000
katalis	5.665	2	2.832	141622437.4	.000
fiber	22.474	2	11.237	561846005.8	.000
katalis * fiber	15.607	4	3.902	195087927.8	.000
Error	1.800E-7	9	2.000E-8		
Total	1009.500	18			
Corrected Total	43.746	17			

a. R Squared = 1,000 (Adjusted R Squared = 1,000)

Duncan katalis *bending* (fB)

Uji_Bending_fB

Duncan[a,b]

katalis	N	Subset 1	Subset 2	Subset 3
1	6	6.569500		
0,5	6		7.492267	
0,75	6			7.912700
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 2,00E-008.

a. Uses Harmonic Mean Sample Size = 6,000.

b. Alpha = ,05.

Duncan fiber kelapa sawit *bending* (fB)

Uji_Bending_fB

Duncan[a,b]

fiber	N	Subset 1	Subset 2	Subset 3
12,5	6	6.185867		
10	6		6.945667	
7,5	6			8.842933
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 2,00E-008.

a. Uses Harmonic Mean Sample Size = 6,000.

b. Alpha = ,05.

Uji T

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Uji_Bending_fM	7.431817	18	1.5877965	.3742472
	control_Uji_Bending_fM	18.885100	18	.0000000	.0000000
Pair 2	Uji_Bending_fB	7.324822	18	1.6041449	.3781006
	control_Uji_Bending_fB	9.942700	18	.0000000	.0000000

One-Sample Test

	Test Value = 18.8851					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Uji_Bending_fM	-30.604	17	.000	-11.4532833	-12.242876	-10.663691

One-Sample Test

	Test Value = 9.9427					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Uji_Bending_fB	-6.924	17	.000	-2.6178778	-3.415600	-1.820155

Lampiran 3. Dokumentasi Penelitian
Persiapan *fiber* kelapa sawit

Membersihkan dan mengeringkan *fiber* kelapa sawit

Memotong *fiber* dengan Panjang 1-1,5 cm

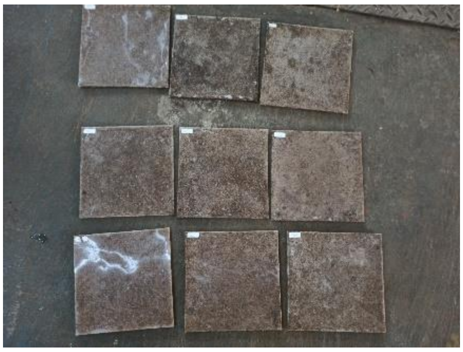
Fiber siap untuk pembuatan *fiberglass*

Pembuatan komposit *fiberglass*

menimbang bahan

Menuang resin ke cetakan yang berisi *fiber* dan diratakan

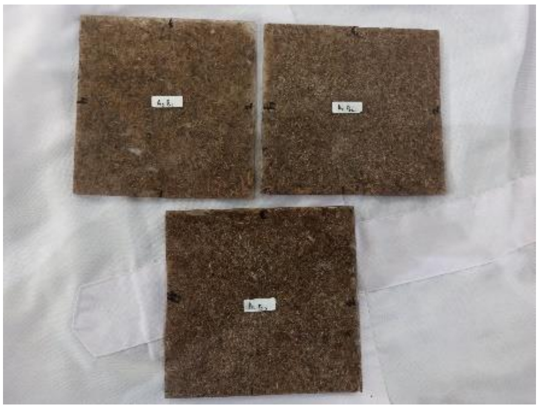
Menunggu adonan hingga mongering sempurna



Komposit *Fiberglass* setelah mongering sempurna

Pemotongan untuk pengujian

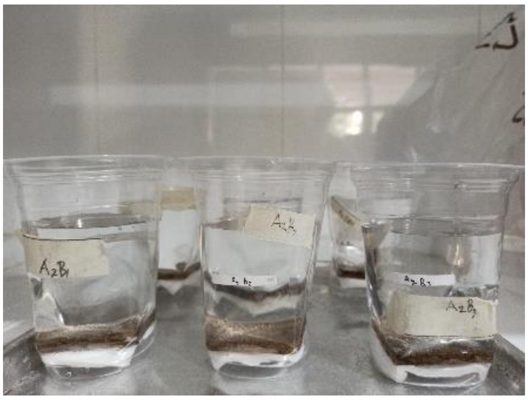
Pengujian komposit *fiberglass*



Sifat dan tampak

Uji dimensi ketebalan

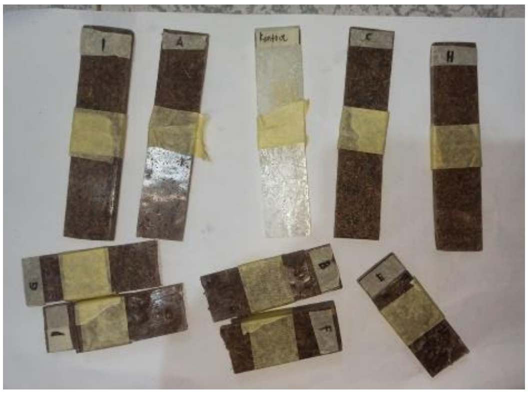
Uji porositas



Uji kedap air

Uji *bending*

Sampel uji *bending* sebelum patahan



Sampel setelah patahan