LAMPIRAN A
PERHITUNGAN KOMPOSIT

Untuk menentukan massa serbuk dan resin yang digunakan dalam pembuatan komposit fraksi volume serbuk 60% pada masing masing sampel uji bending, tarik dan akustik dilakukan dengan rumus:

$$\rho = \frac{m}{v}$$

1. Uji Tarik dan Bending

V cetakan = $P \times l \times t$
= 25 cm × 25 cm × 1 cm
= 625 cm³

Kebutuhan Perekat Tiap Cetakan

Mp = Fraksi volume Perekat x V cetakan x ρ poliester
= 40% × 625 cm³ × 1,23 gr
= 307,5 gr

Komposisi

Ampas Tebu 60%

Massa Serbuk

Ms = V cetakan × 60% × ρserbuk Ampas Tebu
= 625 cm³ × 60% × 0,6
= 375 cm³ × 0,6
= 255 gr

Ampas Tebu dan Kayu Sengon 20% : 40%

Massa Serbuk Ampas Tebu

Ms = V cetakan × 40% × ρserbuk Ampas Tebu
= 625 cm³ × 40% × 0,6
= 250 cm³ × 0,6
= 150 gr

Massa Serbuk Kayu Sengon

Ms = V cetakan × 20% × ρserbuk Kayu Sengon
= 625 cm³ × 20% × 0,8
= 125 cm³ × 0,8
= 100 gr

Ampas Tebu dan Kayu Sengon 30% : 30%

Massa Serbuk Ampas Tebu

Ms = V cetakan × 30% × ρserbuk Ampas Tebu
= 625 cm³ × 30% × 0,6
= 187,5 cm³ × 0,6
= 112,5 gr

Massa Serbuk Kayu Sengon

Ms = V cetakan × 30% × ρserbuk Kayu Sengon
= 625 cm³ × 30% × 0,8
= 187,5 cm³ × 0,8
= 155,62 gr

Ampas Tebu dan Kayu Sengon 40% : 20%

Massa Serbuk Ampas Tebu

Ms = V cetakan × 20% × ρserbuk Ampas Tebu
= 625 cm³ × 20% × 0,6 gr
= 125 cm³ × 0,6 gr
= 75 gr

Massa Serbuk Kayu Sengon

Ms = V cetakan × 40% × ρserbuk Kayu Sengon
= 625 cm³ × 40% × 0,8
= 250 cm³ × 0,8
= 200 gr

Kayu sengon 60%

Massa Serbuk (Vf)

Ms = V cetakan × 60% × ρserbuk Kayu Sengon
= 625 cm³ × 60% × 0,8
= 375 cm³ × 0,8
= 311,25 gr

LAMPIRAN B
PERHITUNGAN LARUTAN NaOH 5%

Perhitungan larutan NaOH konsentrasi 5% w/w dengan aquades 1000 ml (dengan perbandingan serat 50 gram)

$\% \boldsymbol{w/w} = \frac{\text{Wterlarut}}{\text{Wlarutan}}$

$\frac{5}{100} = \frac{\text{W}}{\text{W} + 1000\ \text{gr}}$

$\frac{1}{20} = \frac{\text{W}}{\text{W} + 1000\ \text{gr}}$

$20\ \boldsymbol{w} = W + 1000\ gr$

$19\ \boldsymbol{w} = 1000\ gr$

$\boldsymbol{w} = 52{,}6315$ gram (NaOH)

LAMPIRAN C
PERHITUNGAN MIKRO MEKANIK

$$Epc = \frac{Vf \times Eb}{1-Vf\left(1-\frac{Eb}{Ep}\right)} + (1\text{-}Vf) \times Eb$$

(1) Ampas tebu 100%

$$Epc = \frac{60\% \times 3{,}3}{1-60\% \times \left(1-\frac{3{,}3}{9}\right)} + (1\text{-}60\%) \times 3{,}3 = 4{,}4 \text{ Gpa}$$

$$\sigma pc = \frac{60\% \times 40}{1-60\% \times \left(1-\frac{40}{31{,}44}\right)} + (1\text{-}60\%) \times 40 = 36{,}63 \text{ Mpa}$$

(2) Ampas tebu 20% dan kayu sengon 40%

$$Epc = \frac{60\% \times 3{,}3}{1-60\% \times \left(1-\frac{3{,}3}{33\% \times 9+67\% \times 5{,}5}\right)} + (1\text{-}60\%) \times 3{,}3 = 4{,}16 \text{ Gpa}$$

$$\sigma pc = \frac{60\% \times 40}{1-60\% \times \left(1-\frac{40}{33\% \times 31{,}44+67\% \times 75{,}59}\right)} + (1\text{-}60\%) \times 40 = 46{,}25 \text{ Mpa}$$

(3) Ampas tebu 30% dan kayu sengon 30%

$$Epc = \frac{60\% \times 3{,}3}{1-60\% \times \left(1-\frac{3{,}3}{50\% \times 9+50\% \times 5{,}5}\right)} + (1\text{-}60\%) \times 3{,}3 = 4{,}26 \text{ Gpa}$$

$$\sigma pc = \frac{60\% \times 40}{1-60\% \times \left(1-\frac{40}{50\% \times 31{,}44+50\% \times 75{,}59}\right)} + (1\text{-}60\%) \times 40 = 44{,}29 \text{ Mpa}$$

(4) Ampas tebu 40% dan kayu sengon 20%

$$Epc = \frac{60\% \times 3{,}3}{1-60\% \times \left(1-\frac{3{,}3}{67\% \times 9+33\% \times 5{,}5}\right)} + (1\text{-}60\%) \times 3{,}3 = 4{,}35 \text{ Gpa}$$

$$\sigma pc = \frac{60\% \times 40}{1-60\% \times \left(1-\frac{40}{67\% \times 31{,}44+33\% \times 75{,}59}\right)} + (1\text{-}60\%) \times 40 = 42{,}04 \text{ Mpa}$$

(5) Kayu sengon 60%

$$Epc = \frac{60\% \times 3{,}3}{1-60\% \times \left(1-\frac{3{,}3}{5{,}5}\right)} + (1\text{-}60\%) \times 3{,}3 = 3{,}9 \text{ Gpa}$$

$$\sigma pc = \frac{60\% \times 40}{1-60\% \times \left(1-\frac{40}{75{,}59}\right)} + (1\text{-}60\%) \times 40 = 49{,}45 \text{ Mpa}$$

LAMPIRAN D

PERHITUNGAN *MODULUS OF ELASTISITY*

Modulus elastisitas lentur (kgf/cm^2) $= \frac{S^2}{4LT^3} \times \frac{\Delta B}{\Delta D}$

$= \frac{16{,}5^2}{4 \times 4{,}96 \times 1{,}099^3} \times \frac{1{,}285}{8{,}474}$

$= \frac{4492{,}13}{4{,}6248} \times \frac{1{,}285}{8{,}474}$

$= 25{,}82$

Sampel	T	L	B1	B2	ΔB	D1	D2	ΔD	MOE	Rata-rata MOE	S
	(cm)	(cm)	(kgf)	(kgf)	(kgf)	(cm)	(cm)	(cm)	(kgf/)	(kgf/)	(cm)
1	1,099	4,968	2,571	1,286	1,285	13,356	4,882	8,474	25,82	27,30	16,5
2	1,096	4,968	2,571	1,286	1,285	12,086	5,814	6,272	35,17		16,5
3	1,133	4,888	3,214	1,929	1,285	22,504	12,795	9,709	20,90		16,5
4	1,093	4,968	8,357	4,669	3,688	8,994	3,214	5,78	110,46		16,5
5	1,112	5,018	9,000	3,857	5,143	10,860	6,454	3,857	217,02	171,61	16,5
6	1,137	4,948	7,071	2,571	4,5	9,597	5,888	3,709	187,34		16,5
7	1,145	4,998	6,429	3,214	3,215	9,932	4,547	5,385	88,48		16,5
8	1,133	4,938	5,786	2,571	3,215	8,912	5,515	3,397	147,99	117,84	16,5
9	1,135	5,28	5,786	1,929	3,857	10,623	5,59	5,033	117,06		16,5
10	1,145	4,948	13,5	7,071	6,429	13,502	7,106	6,396	151,97		16,5
11	1,139	4,998	9,643	5,786	3,857	15,005	9,138	5,867	99,96	116,72	16,5
12	1,1	4,998	10,286	5,786	4,5	13,296	5,563	7,733	98,23		16,5
13	1,146	5,040	14,786	9,000	5,786	10,218	6,439	3,779	226,67		16,5
14	1,161	5,038	14,786	8,357	6,429	10,249	6,755	3,494	291,16	256,73	16,5
15	1,121	5,018	16,017	10,286	5,731	9,778	6,17	3,608	252,35		16,5

LAMPIRAN E

PERHITUNGAN *MODULUS OF RUPTURE*

Keteguhan lentur (kgf/cm^2) $= \frac{3BS}{2LT^2}$

$= \frac{3 \times 3{,}214 \times 16{,}5}{2 \times 4{,}968 \times 1{,}99^2}$

$= 13{,}25$

Sampel	T (cm)	L (cm)	B (kgf)	S (cm)	MOR (kgf/cm)	Rata- rata MOR (kgf/cm)
1	1,099	4,968	3,214	16,5	13,25	13,93
2	1,096	4,968	3,214	16,5	13,32	
3	1,133	4,888	3,857	16,5	15,21	
4	1,093	4,968	7,071	16,5	45,57	44,71
5	1,112	5,018	5,429	16,5	46,15	
6	1,137	4,948	5,429	16,5	42,42	
7	1,145	4,998	10,929	16,5	26,44	22,79
8	1,133	4,938	11,571	16,5	21,19	
9	1,135	5,28	10,286	16,5	20,74	
10	1,145	4,948	15,429	16,5	58,86	47,28
11	1,139	4,998	10,929	16,5	41,71	
12	1,1	4,998	10,929	16,5	41,28	
13	1,146	5,040	18,000	16,5	67,30	69,95
14	1,161	5,038	18,000	16,5	65,60	
15	1,121	5,018	18,643	16,5	76,96	

LAMPIRAN F

PERHITUNGAN KETEGUHAN TARIK TEGAK LURUS PERMUKAAN

Keteguhan tarik tegak lurus permukaan (kgf/cm^2) $= \frac{B}{P \times L}$

$= \frac{182,571}{4,988 \times 4,987}$

$= \frac{182,571}{24,875156}$

$= 7,33$

Sampel	P (cm)	L (cm)	P × L ()	B (kgf)	IBS (kgf/cm^2)	Rata-rata IBS (kgf/cm^2)
1	4,988	4,987	24,875156	182,57	7,33	8,38
2	4,969	4,965	24,671085	232,71	9,43	
3	4,979	4,996	24,875084	207,64	8,34	9,25
4	5,018	5,073	25,456314	259,07	10,17	
5	4,963	5,004	24,834852	151,07	6,08	6,81
6	4,977	4,992	24,845184	187,71	7,55	
7	4,982	5,002	24,919964	134,35	5,39	7,65
8	4,962	5,014	24,879468	246,85	9,92	
9	5,015	5	25,075	193,50	7,71	9,52
10	4,997	5,007	25,019979	283,50	11,33	

LAMPIRAN G
PERHITUNGAN VOID

Perhitungan kadar void : $V = 100 \frac{Td-Md}{Td}$

$V = 100 \frac{0,83-0,80}{0,83}$

$V = 3,2\%$

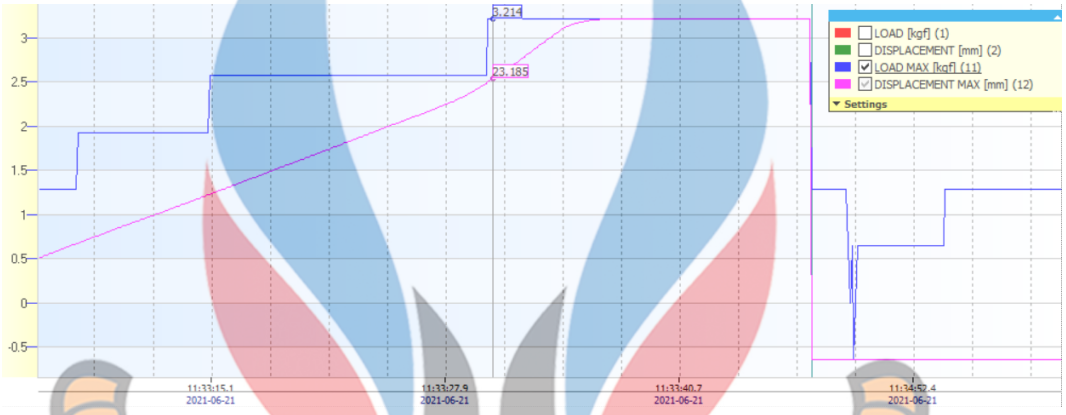
Spesimen	Teori Densitas (gr/cm^3)	Densitas Komposit (gr/cm^3)	Kandungan *Void* (%)	Rata-rata	Standar Deviasi
A1	0,83	0,80	3,61	11,88	12,85
A2	0,83	0,61	26,64		
A3	0,83	0,78	5,8		
B1	0,89	0,64	27,29	26,47	5,59
B2	0,89	0,60	31,61		
B3	0,89	0,70	20,20		
C1	0,90	0,73	18,95	17,17	5,00
C2	0,90	0,71	21,04		
C3	0,90	0,80	11,51		
D1	0,93	0,74	20,52	19,03	1,44
D2	0,93	0,75	18,93		
D3	0,93	0,76	17,64		
E1	0,96	0,95	1,51	5,60	3,75
E2	0,96	0,90	6,39		
E3	0,96	0,88	8,91		

LAMPIRAN H

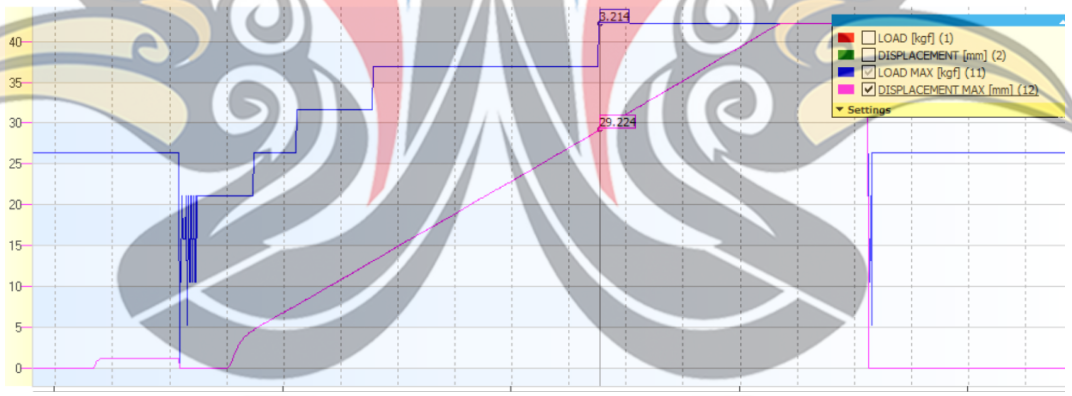
REPORT DATA HASIL UJI BENDING

1. Grafik hasil bending A1, A2, dan A3

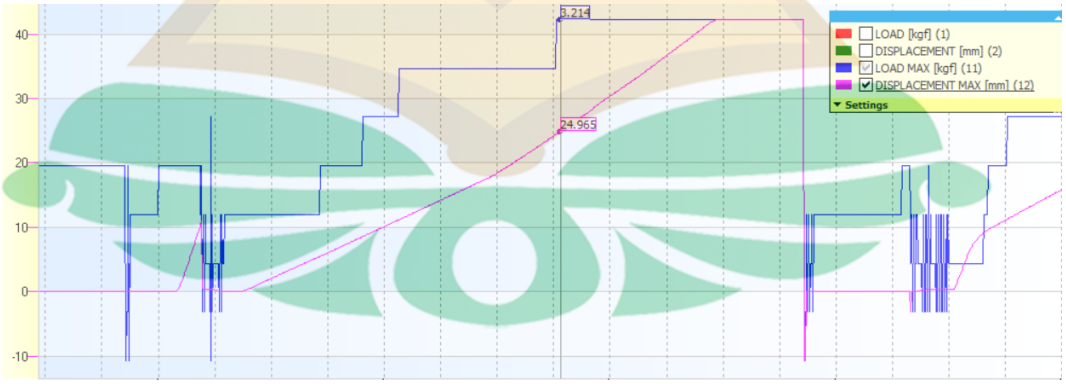
Gambar 1. Hasil bending sampel A1



Gambar 2. Hasil bending sampel A2

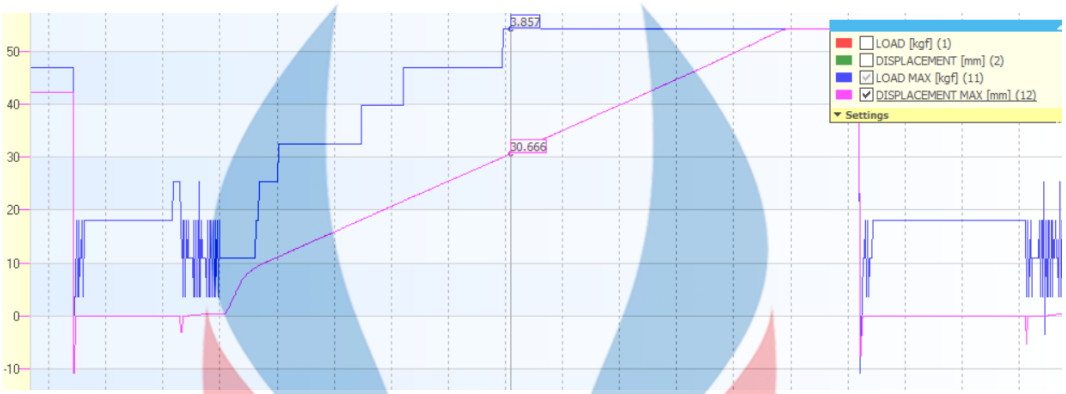


Gambar 3. Hasil bending sampel A3

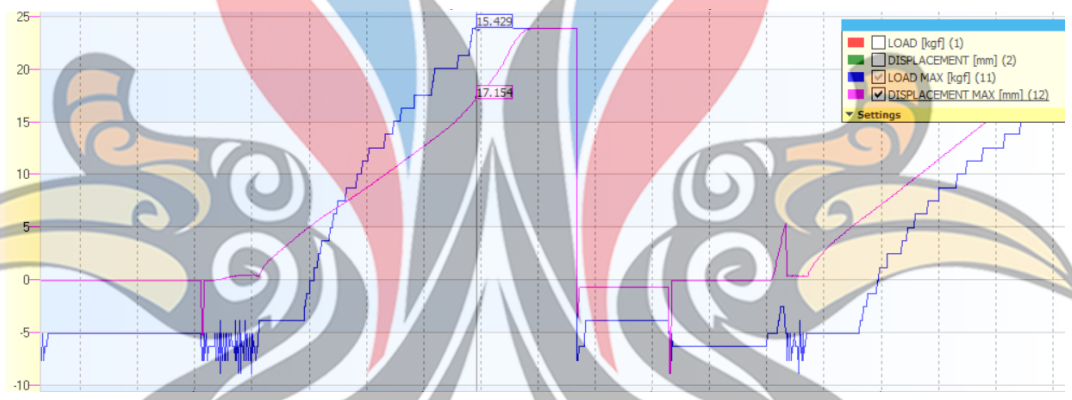


2. Grafik Hasil Bending B1, B2, dan B3

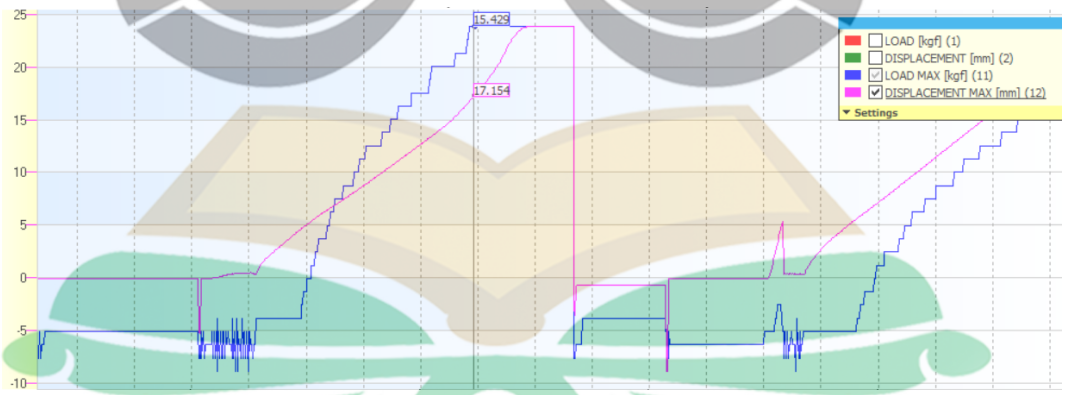
Gambar 4. Hasil bending sampel B1



Gambar 5. Hasil bending sampel B2

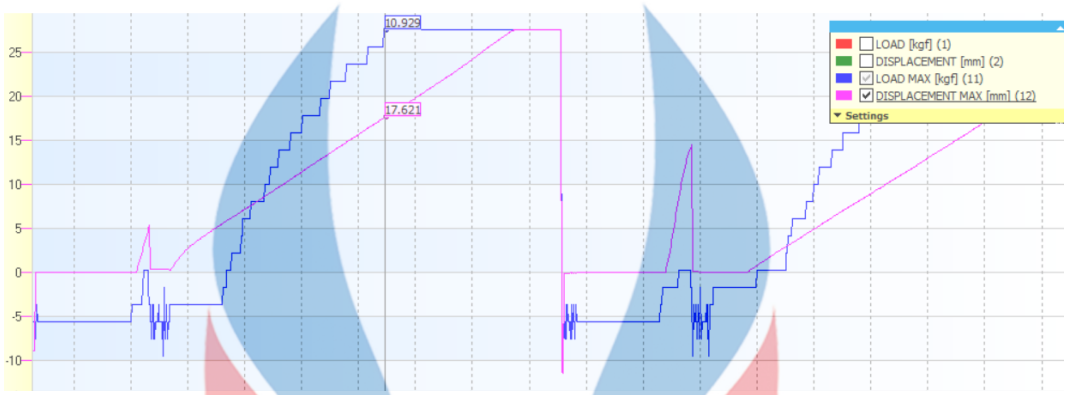


Gambar 6. Hasil bending sampel B3

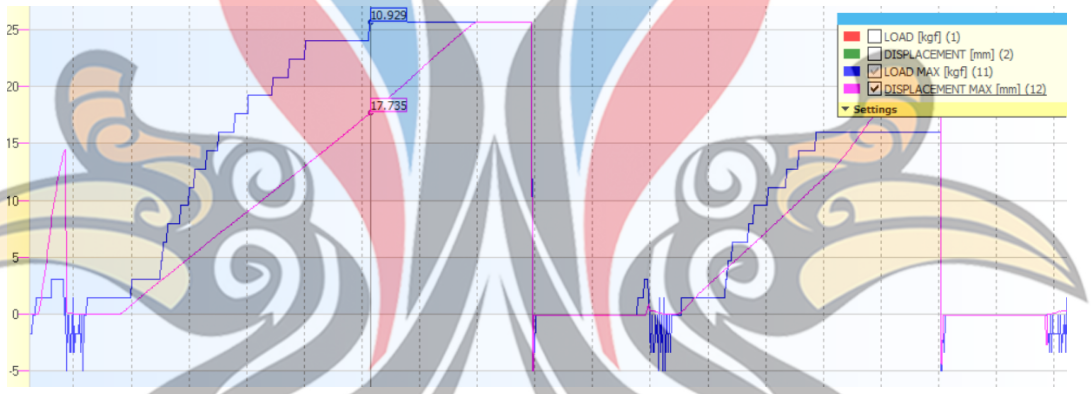


3. Grafik Hasil Bending C1, C2, dan C3

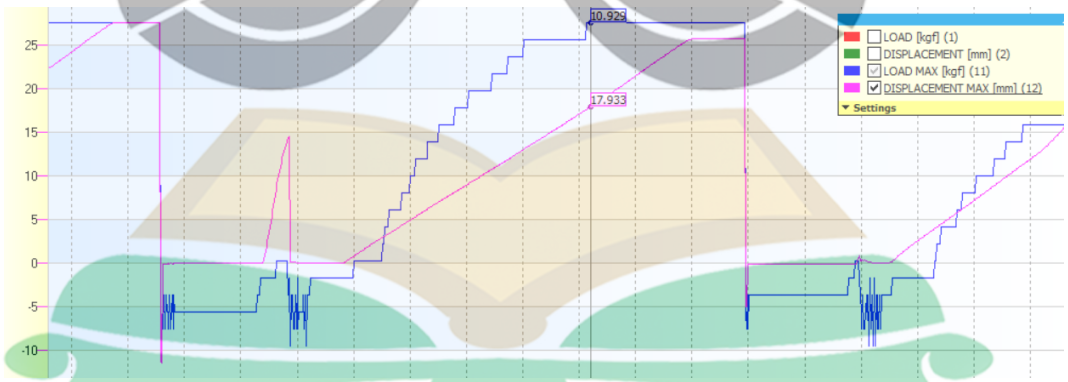
Gambar 7. Hasil bending sampel C1



Gambar 8. Hasil bending C2

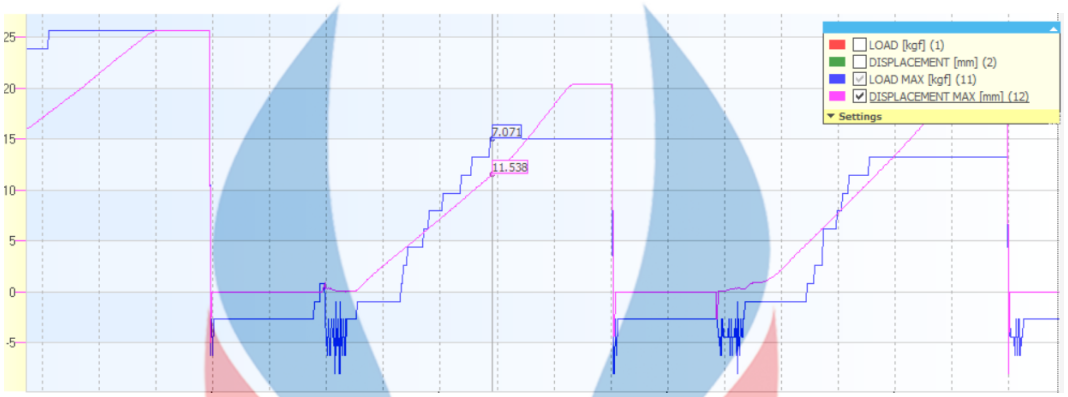


Gambar 9. Hasil bending C3

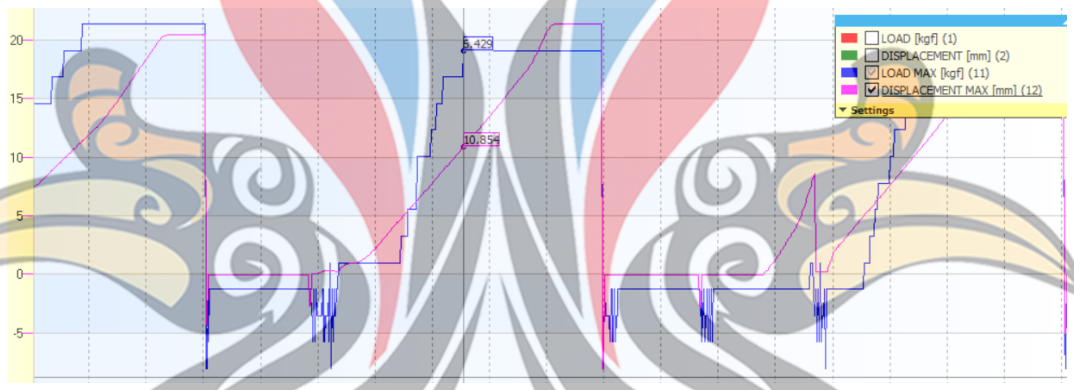


4. Grafik Hasil Bending D1, D2, dan D3

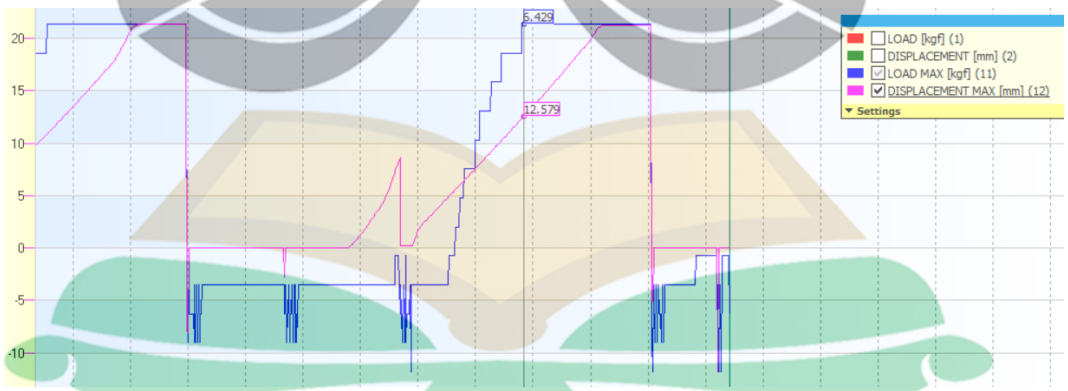
Gambar 10. Hasil bending D1



Gambar 11. Hasil bending D2

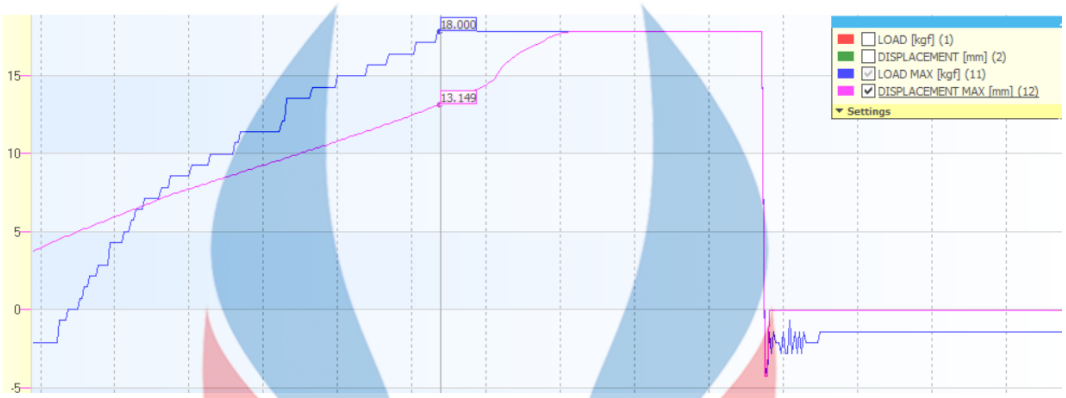


Gambar 12. Hasil bending D3

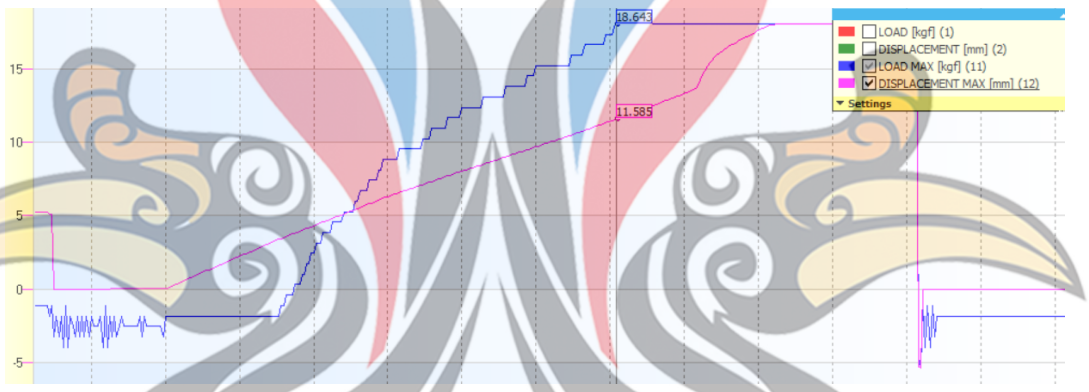


5. Grafik Hasil Bending E1, E2, dan E3

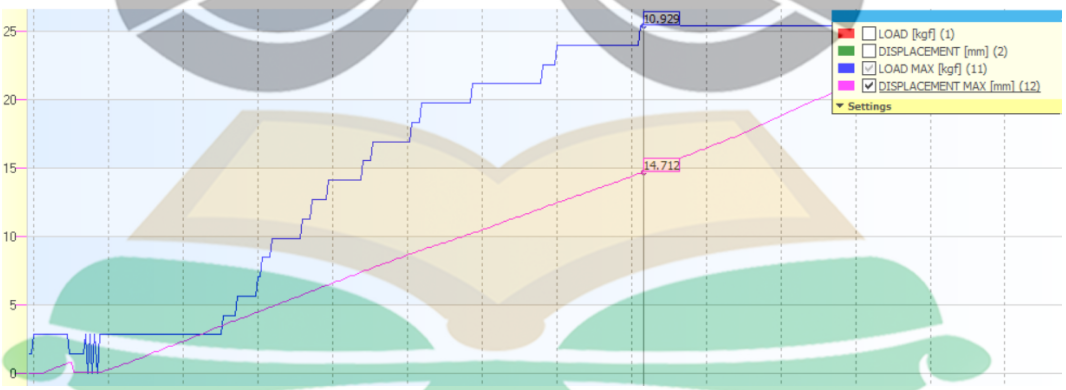
Gambar 13. Hasil bending sampel E1



Gambar 14. Hasil bending sampel E2



Gambar 15. Hasil bending sampel E3

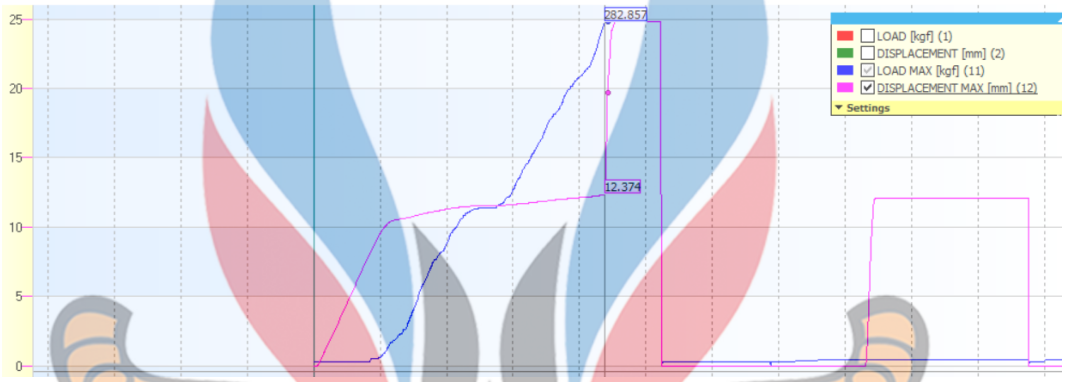


LAMPIRAN I

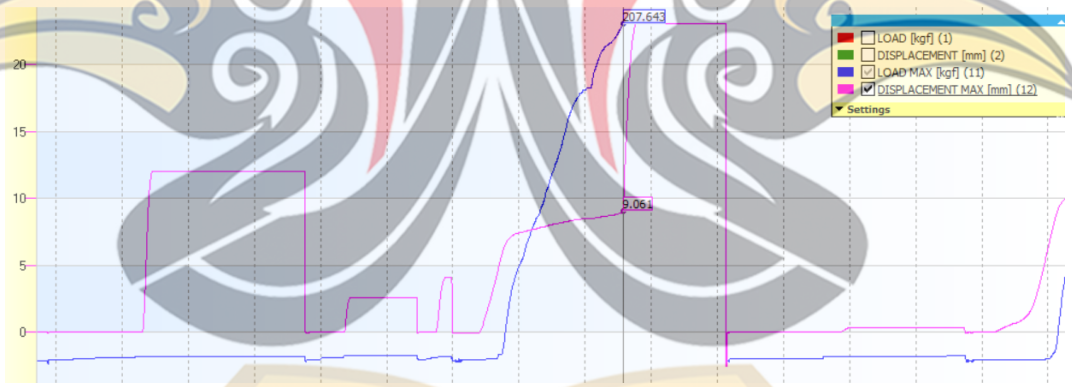
REPORT DATA HASIL UJI KETEGUHAN TARIK TEGAK LURUS PERMUKAAN

1. Grafik Hasil Keteguhan Tarik Tegak Lurus Permukaan A1, dan A2

Gambar 1. Hasil uji tarik A1

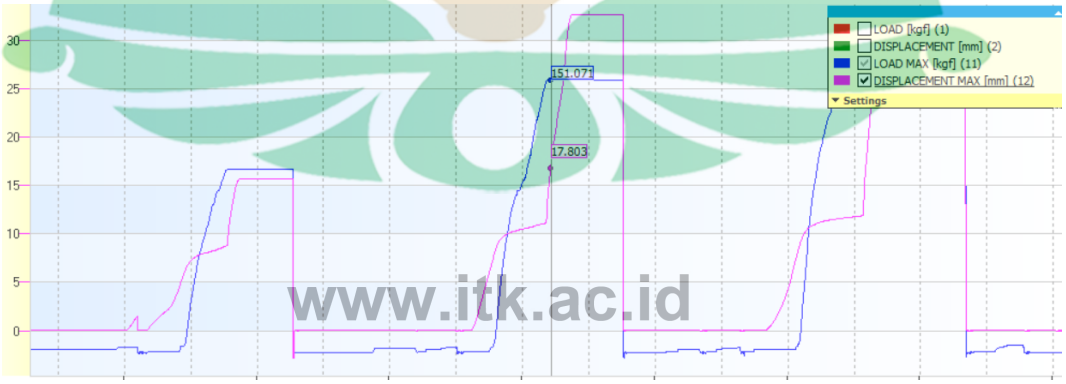


Gambar 2. Hasil uji tarik A2

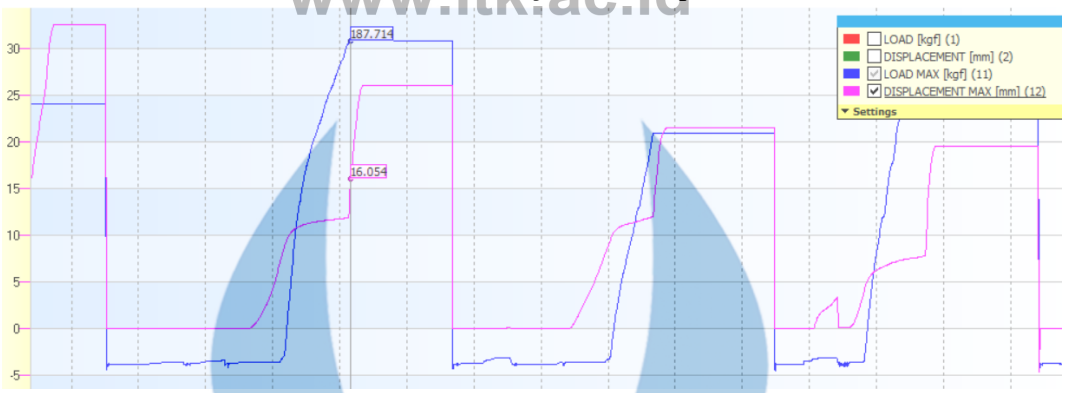


2. Gambar Hasil Keteguhan Tarik Tegak Lurus Permukaan B1, dan B2

Gambar 3. Hasil uji tarik sampel B1

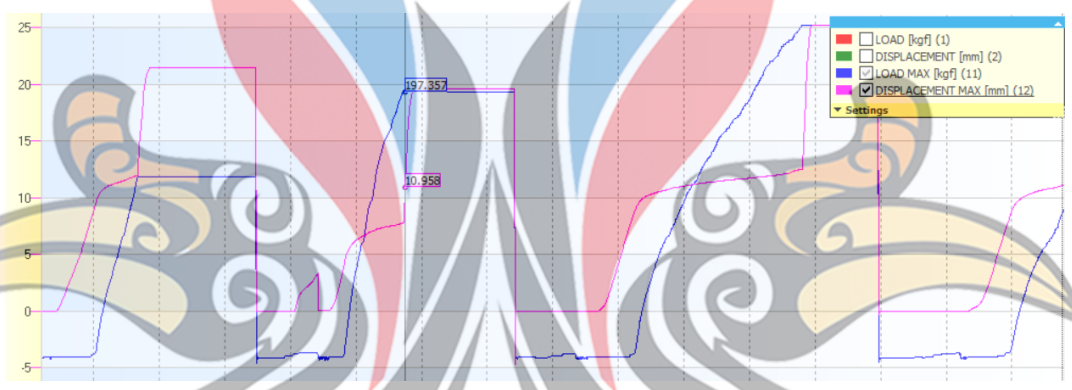


Gambar 4. Hasil uji tarik sampel B2

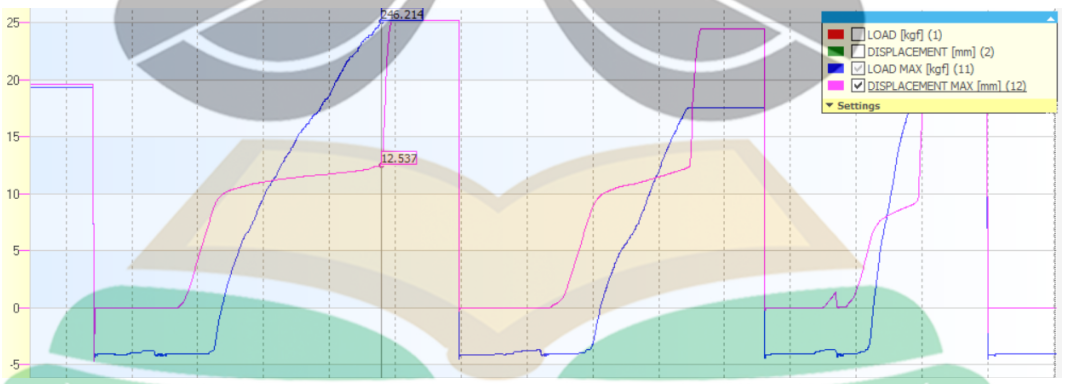


3. Grafik Hasil Keteguhan Tarik Tegak Lurus Permukaan C1, dan C2

Gambar 5. Hasil uji tarik sampel C1

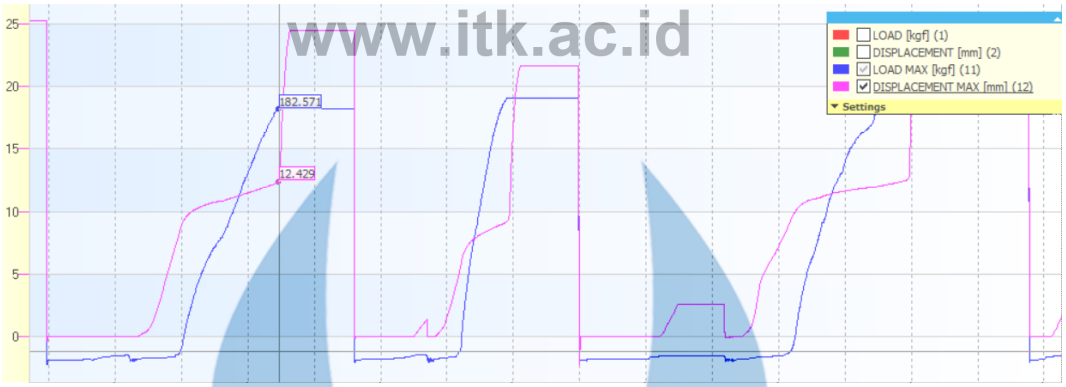


Gambar 6. Hasil uji tarik sampel C2

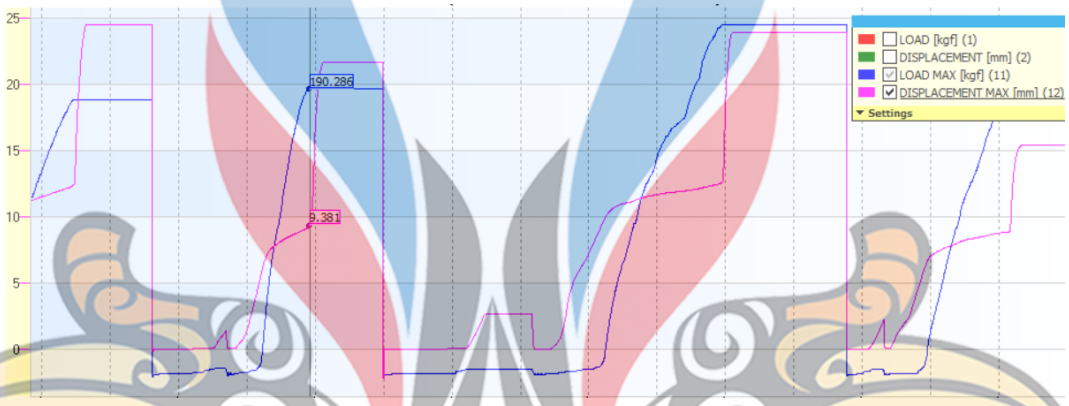


4. Grafik hasil Keteguhan Tarik Tegak Lurus Permukaan D1, dan D2

Gambar 7. Hasil uji tarik sampel D1

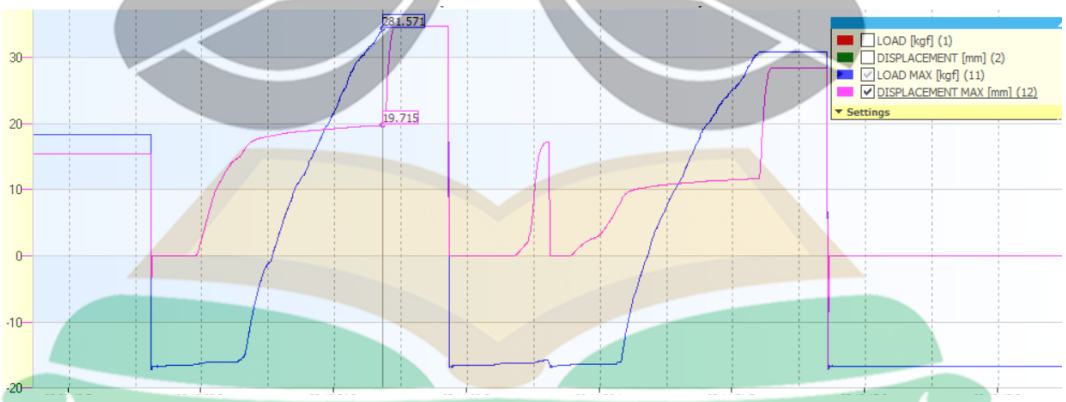


Gambar 8. Hasil uji tarik sampel D2

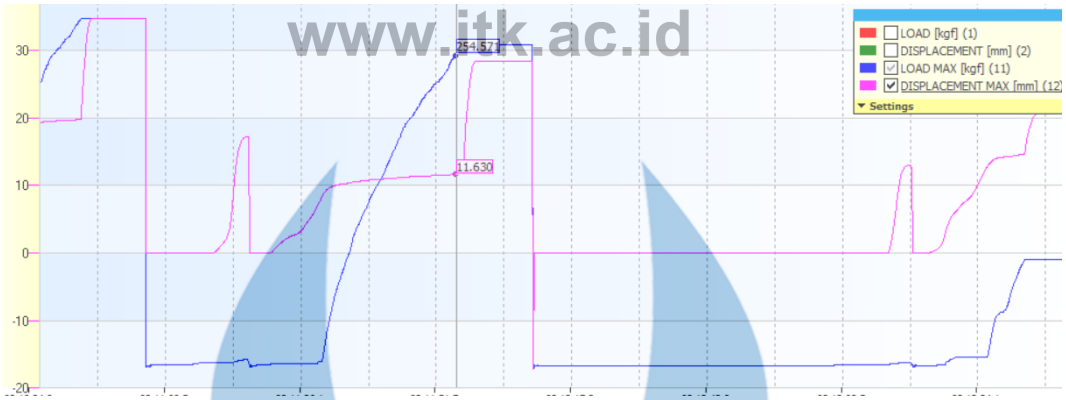


5. Grafik Hasil Keteguhan Tarik Tegak Lurus Permukaan E1, dan E2

Gambar 9. Hasil uji tarik sampel E1



Gambar 10. Hasil uji tarik sampel E2



LAMPIRAN J
BIOGRAFI PENULIS

Nama lengkap penulis Rudzi Dikman. Lahir pada tanggal 02 Desember 1999 di Balikpapan. Merupakan anak ke-2 dari 2 bersaudara. Pendidikan, yang telah ditempuh oleh penulit yaitu TK kenanga Samboja, SND 028 Samboja, SMP Plus Melati Samarinda, SMAS Patra Dharma Balikpapan, dan berkuliah di Institut Teknologi Kalimantan, Jurusan Ilmu Kebumian dan Lingkungan, program studi Teknik Material dan Metalurgi. Selama berkuliah penulis aktif dalam organisasi dan juga kepanitian yang ada di kampus. Dengan semangat dan niat penulis telah menyelesaikan.