LAMPIRAN

PERHITUNGAN FRAKSI VOLUME SERAT KOMPOSIT HIBRID KENAF DENGAN MATRIKS PP DAN LDPE

Sebelum proses pencetakan dimulai maka dilakukan perhitungan terlebih dahulu, yaitu perhitungan terhadap massa serat, dan massa matriks. Fraksi volume serat kenaf dengan matriks (PP dan LDPE) adalah 70%: 30%. Sedangkan fraksi volume matriks PP dan LDPE yang digunakan adalah 1:2, 1:1, dan 2:1. Adapun perhitungannya sebagai berikut :

Diketahui :

Massa jenis serat kenaf = 1,45 gr/mm^3

Massa jenis *polypropilene* = 0,92 gr/cm^3

Massa jenis *polyethylene* = 0,94 gr/cm^3

Dimensi cetakan : Panjang (p) = 17 cm

Lebar (l) = 2 cm

Tebal (t) = 0,4 cm

1) Fraksi volume matriks PP/LDPE dengan perbandingan 1:1

Volume cetakan, V_e = p x l x t

= 17 cm x 2 cm x 0.4 cm

= 13.6 cm^3

Volume matrik, V_m = $\frac{70}{100}$ x 13.6 cm^3

= 9.54 cm^3

Volume serat kenaf, V_s = $\frac{30}{100}$ x 13.6 cm^3

= 4.08 cm^3

Volume matrik PP, V_{PP} = $\frac{1}{2}$ x 9.54 cm^3

= 4.77 cm^3

Volume matrik LDPE, V_{PE} = $\frac{1}{2}$ x 9.54 cm^3

= 4.77 cm^3

Massa serat kenaf, m_{kenaf} = V_{kenaf} x ρ_{kenaf}

= 4.08 cm^3 x 1.45 gr/cm^3

= 5.9 gr

Masaa PP, m_{PP} = V_{PP} x ρ_{PP}

= 4.77 cm^3 x 0.92 gr/cm^3

= 4.38 gr

Masaa LDPE, m_{PE} = V_{PE} x ρ_{PE}

= 4.77 cm^3 x 0.94 gr/cm^3

= 4.53 gr

Massa MAPP = 5.9 gr x 5%

= 0.295 gr

2) Fraksi volume matriks PP/LDPE dengan perbandingan 1:2

Volume cetakan, V_e = p x l x t

= 17 cm x 2 cm x 0.4 cm

= 13.6 cm^3

Volume matrik, V_m = $\frac{70}{100}$ x 13.6 cm^3

= 9.52 cm^3

Volume serat kenaf, V_s = $\frac{30}{100}$ x 13.6 cm^3

= 4.08 cm^3

Volume matrik PP, V_{PP} = $\frac{1}{3}$ x 9.52 cm^3

= 3.17 cm^3

Volume matrik LDPE, V_{PE} = $\frac{2}{3}$ x 9.52 cm^3

= 6.34 cm^3

Massa serat kenaf, m_{kenaf} = V_{kenaf} x ρ_{kenaf}

= 4.08 cm^3 x 1.45 gr/cm^3

= 5.9 gr

Masaa PP, m_{PP} = V_{PP} x ρ_{PP}

= 3.17 cm^3 x 0.92 gr/cm^3

= 2.91 gr

Masaa LDPE, m_{PE} = V_{PE} x ρ_{PE}

= 6.34 cm^3 x 0.94 gr/cm^3

= 5.95 gr

Massa MAPP = 5.9 gr x 5%

= 0.295 gr

3) Fraksi volume matriks PP/LDPE dengan perbandingan 2:1

Volume cetakan, V_e = p x l x t

= 17 cm x 2 cm x 0.4 cm

= 13.6 cm^3

Volume matrik, V_m = $\frac{70}{100}$ x 13.6 cm^3

= 9.52 cm^3

Volume serat kenaf, V_s = $\frac{30}{100}$ x 13.6 cm^3

= 4.08 cm^3

Volume matrik PP, V_{PP} = $\frac{2}{3}$ x 9.52 cm^3

= 6.34cm^3

Volume matrik LDPE, V_{PE} = $\frac{1}{3}$ x 9.52 cm^3

= 3.17 cm^3

Massa serat kenaf, m_{kenaf} = V_{kenaf} x ρ_{kenaf}

= 4.08 cm^3 x 1.45 gr/cm^3

= 5.9 gr

Masaa PP, m_{PP} = V_{PP} x ρ_{PP}

= 6.34 cm^3 x 0.92 gr/cm^3

= 5.88 gr

Masaa LDPE, m_{PE} = V_{PE} x ρ_{PE}

= 3.17 cm^3 x 0.94 gr/cm^3

= 2.97 gr

Massa MAPP = 5.9 gr x 5%

= 0.295 gr

HASIL PENGUJIAN SERAT KENAF

Kenaf	Rata-rata		Luas Area (mm2)	Nilai Beban Pembacaan (Kgf)	F	σ Tarik (Mpa)	(L) Standar ASTM (mm)	Measurement travel end /ΔL (mm)	ϵ (Tarik)	E
	(µm)	(mm)								
1	91,79	0,092	0,00661874	0,155	1,521	229,73	50	0,6060	0,0121	18954,96
2	128,5	0,129	0,01296869	0,234	2,296	177,01	50	0,6160	0,0123	14367,39
3	128,5	0,129	0,01296869	0,235	2,305	177,76	50	0,7700	0,0154	11543,03
4	124,8	0,125	0,01223261	0,254	2,492	203,70	50	0,8400	0,0168	12124,79
5	117,5	0,118	0,0108434	0,198	1,942	179,13	50	0,6700	0,0134	13367,92
6	113,8	0,114	0,01017125	0,235	2,305	226,65	50	0,8800	0,0176	12878,04
7	121,2	0,121	0,01153706	0,262	2,570	222,78	50	0,7400	0,0148	15052,67
Rata - rata		0,118				202,39			0,0146	14041,26
Standar Deviasi						24,31			0,0021	2483,08
Coefficient of Variation (%)						12,01			14,58	17,68

GRAFIK PENGUJIAN TARIK SERAT TUNGGAL KENAF

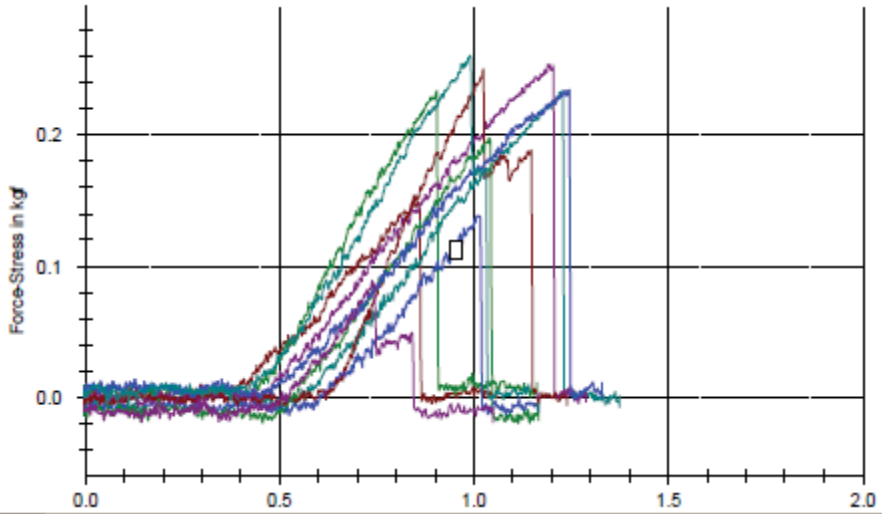
Serat Tunggal (serat kenaf)

Parameter table:

Headline	: Serat Tunggal (serat kenaf)	Evaluat. method	: M (Automatic A, B or C)
Customer	: 923/LUPKKP-SERAT/IV/17	Specimen ID	: A1-A10
Tester	: Aprial	Specimen holders	:
Material	: Serat Tunggal	Extensometer	:
Test standard	: ASTM D 3379	Load cell	:

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	0.155	1.06
	2	0.234	1.16
	3	0.139	1.17
	4	0.235	1.37
	5	0.254	1.29
	6	0.251	1.24
	7	0.198	1.17
	8	0.235	1.33
	9	0.262	1.14
	10	0.089	1.05



GRAFIK PENGUJIAN TARIK SERAT TUNGGAL KENAF MATRIK PP/LDPE (1:1)

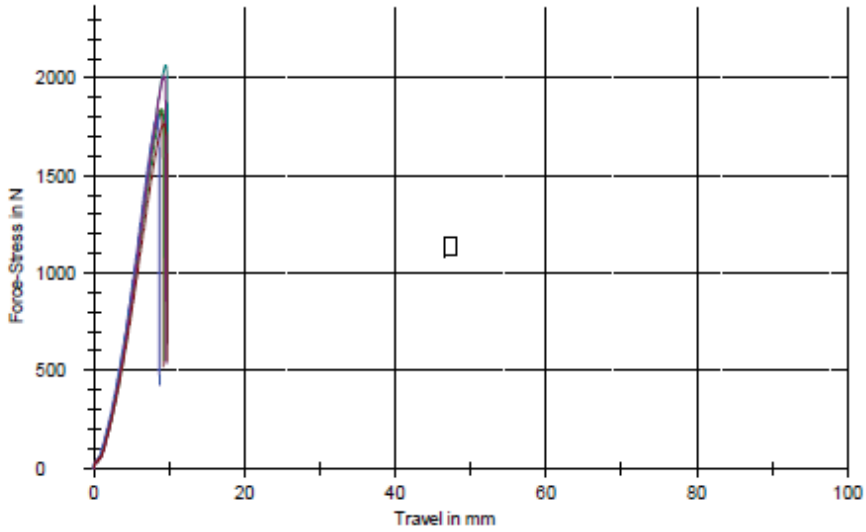
Parameter table:

Headline	: KUAT TARIK KOMPOSIT SERAT ALAM
Customer	: 1636/VII/17
Tester	: APRIAL
Material	: SERAT KENAF MAPP + PP : PE (1:1)
Test standard	: ASTM D 638
Evaluat. method	: M (Automatic A, B or C)
Specimen holders:	
Extensometer	:
Load cell	:

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	18	187,336	9,22
	19	187,656	9,41
	20	184,460	8,71
	21	210,600	9,82
	22	204,900	9,62
	23	180,072	9,75

Series graph:



HASIL PERHITUNGAN KUAT TARIK KOMPOSIT

(PP : LDPE) +MAPP = 1:1											
Spesimen	Tebal	Lebar	Luas Area	F (kgf)	G	F (N)	Kuat Tarik (Mpa)	L0	ΔL	Regangan	Modulus
1	3,4	13,16	44,744	187,336	9,81	1837,766	41,07290721	57	9,22	0,1617544	253,9214
2	3,46	13,26	45,8796	187,656	9,81	1840,905	40,12470379	57	9,41	0,1650877	243,0508
3	3,55	13,4	47,57	210,6	9,81	2065,986	43,43043935	57	9,82	0,1722807	252,0911
4	3,47	13,53	46,9491	204,9	9,81	2010,069	42,81379196	57	9,62	0,1687719	253,6784
5	3,58	13,32	47,6856	180,072	9,81	1766,506	37,04485883	57	9,75	0,1710526	216,5699
Rata - rata							40,89734023			0,1677895	243,8623
Standar Deviasi							2,527784712			0,0043447	15,89644
Coefficient of Variation (%)							6,18			2,59	6,52

GRAFIK PENGUJIAN TARIK SERAT TUNGGAL KENAF MATRIK PP/LDPE (1:2)

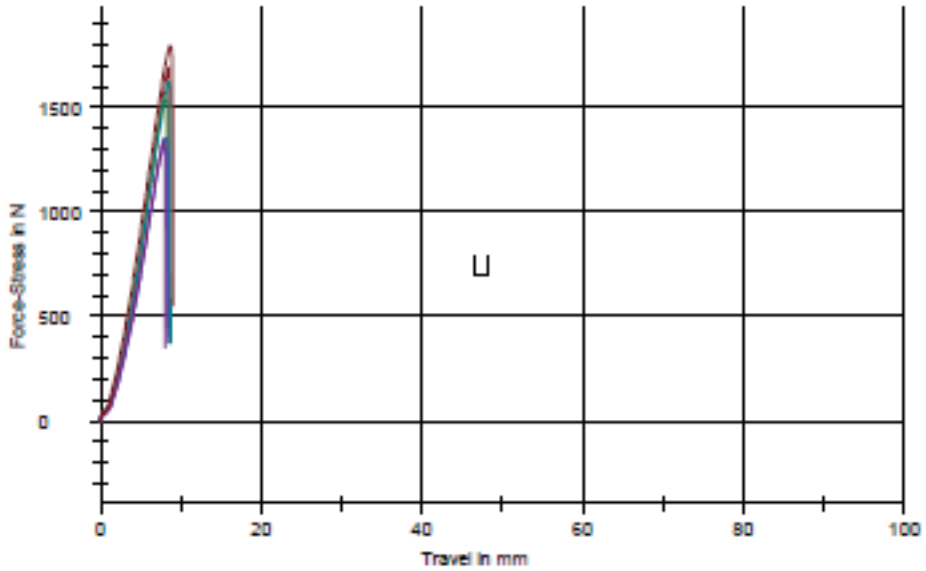
Parameter table:

Headline	: KUAT TARIK KOMPOSIT SERAT ALAM
Customer	: 1637/VII/17
Tester	: APRIAL
Material	: SERAT KENAF MAPP + PP : PE (1:2)
Test standard	: ASTM D 638
Evaluat. method	: M (Automatic A, B or C)
Specimen holders:	
Extensometer	:
Load cell	:

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	24	172,789	8,65
	25	157,215	8,39
	26	137,911	8,37
	27	165,459	8,80
	28	135,324	8,10
	29	182,992	9,06

Series graph:



HASIL PERHITUNGAN KUAT TARIK KOMPOSIT

(PP : LDPE) +MAPP = 1:2											
Spesimen	Tebal	Lebar	Luas Area	F (kgf)	G	F (N)	Kuat Tarik (Mpa)	L0	ΔL	Regangan	Modulus
1	3,64	13,33	48,5212	172,789	9,81	1695,06	34,93442227	57	8,65	0,1517544	230,2037
2	3,44	13,44	46,2336	157,215	9,81	1542,279	33,35840493	57	8,39	0,147193	226,6304
3	3,41	13,2	45,012	137,911	9,81	1352,907	30,05658291	57	8,37	0,1468421	204,6864
4	3,53	13,51	47,6903	165,459	9,81	1623,153	34,0352816	57	8,8	0,154386	220,4558
5	3,71	13,44	49,8624	182,992	9,81	1795,152	36,0021082	57	9,06	0,1589474	226,5033
Rata - rata							33,67735998			0,1518246	221,6959
Standar Deviasi							2,25413657			0,0050886	10,13292
Coefficient of Variation (%)							6,69			3,35	4,57

GRAFIK PENGUJIAN TARIK SERAT TUNGGAL KENAF MATRIK PP/LDPE (2:1)

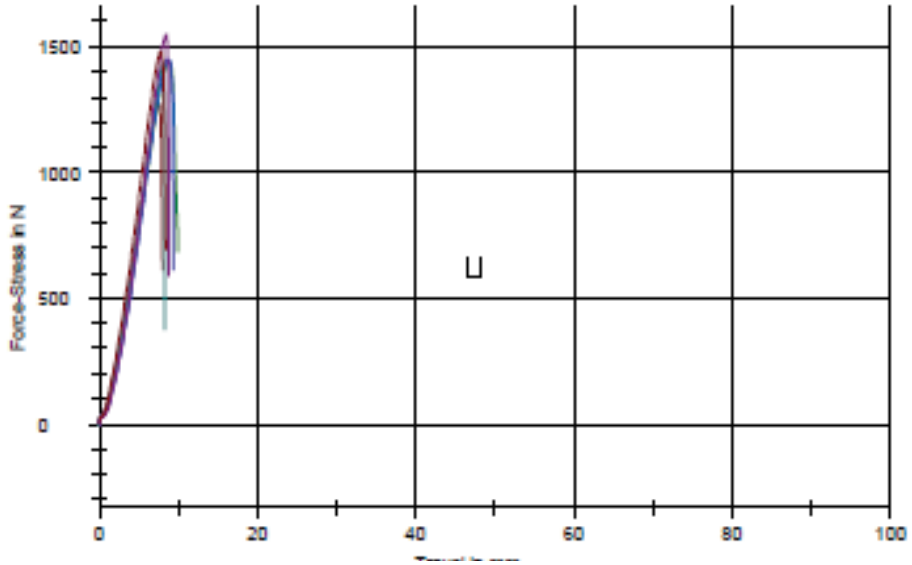
Parameter table:

Headline	: KUAT TARIK KOMPOSIT SERAT ALAM
Customer	: 1638/VII/17
Tester	: APRIAL
Material	: SERAT KENAF MAPP + PP : PE (2:1)
Test standard	: ASTM D 638
Evaluat. method	: M (Automatic A, B or C)
Specimen holders:	
Extensometer	:
Load cell	:

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	30	130,069	8,05
	31	147,326	9,98
	32	147,856	9,38
	33	145,927	8,32
	34	157,889	8,85
	35	150,946	8,42

Series graph:



HASIL PERHITUNGAN KUAT TARIK KOMPOSIT

(PP : LDPE) +MAPP = 2:1											
Spesimen	Tebal	Lebar	Luas Area	F (kgf)	G	F (N)	Kuat Tarik (Mpa)	L0	ΔL	Regangan	Modulus
1	3,54	13,19	46,6926	147,326	9,81	1445,268	30,95282893	57	9,98	0,1750877	176,7847
2	3,42	13,5	46,17	147,856	9,81	1450,467	31,41579727	57	9,38	0,1645614	190,9062
3	3,88	13,47	52,2636	145,927	9,81	1431,544	27,39083932	57	8,32	0,1459649	187,6536
4	3,72	13,36	49,6992	157,889	9,81	1548,891	31,16531232	57	8,85	0,1552632	200,7257
5	3,4	13,29	45,186	150,945	9,81	1480,77	32,77055836	57	8,42	0,1477193	221,8434
Rata - rata							30,73906724			0,1577193	195,5827
Standar Deviasi							2,001432538			0,0121725	16,98663
Coefficient of Variation (%)							6,51			7,72	8,69