LAMPIRAN 1

Perhitungan Fraksi Volume Komposit

A. Perhitungan *volume* dan massa spesimen uji keausan & kekerasan.

Berikut ini perhitungan yang digunakan untuk menentukan volume dan massa dari spesimen uji keausan & kekerasan:

Diketahui :

Massa jenis serat daun nanas = 1,526 gr/cm^3

Massa jenis Magnesium Oksida (Mgo) = 3,58 gr/cm^3

Massa jenis kuningan = 8,4 gr/cm^3

Massa jenis *epoxyresin* = 1,20 gr/cm^3

Dimensi cetakan uji keausan & kekerasan = 4,5 cm^3

Variasi Spesimen A Perbandingan fraksi volume matriks dan *filler* 60/40 (%) dengan fraksi perbandingan volume *filler* 50/30/20 (%).

Volume cetakan, V_c = 30x30x5 = 4500 mm^3 = 4,5cm^3

Volume matriks, V_m = $\frac{60\%}{100\%} x\ 4{,}5\ cm^3$

= 2,70 cm^3

Volume *filler*, V_f = $\frac{40\%}{100\%} x\ 4{,}5\ cm^3$

= 1,8 cm^3

Volume serat, V_s = $\frac{50\%}{100\%} x\ 1{,}8\ cm^3$

= 0,9 cm^3

Volume Kuningan, V_k = $\frac{30\%}{100\%} x\ 1{,}8\ cm^3$

= 0,54 cm^3

Volume MgO, V_{MgO} = $\frac{20\%}{100\%} x\ 1{,}8\ cm^3$

= 0,36cm^3

Massa matriks, m_m = $V_m\ x\ \rho_m$

= 2,70 $cm^3 x$ 1,20 $gr/\ cm^3$

= 3,24 gr

Massa serat, m_s = $V_s\ x\ \rho_s$

= 0,9 cm^{3}x 1,526 gr/ cm^3

= 1,37gr

Massa Kuningan, m_k = $V_k \, x \, \rho_k$

= 0,54 $cm^3 x$ 8,4 $gr/\, cm^3$

= 4,53 gr

Massa MgO, m_{MgO} = V_{MgO} x ρ_{MgO}

= 0,36 $cm^3 x$ 3,58 $gr/\, cm^3$

= 1,29 gr

Variasi Spesimen B Perbandingan fraksi volume matriks dan *filler* 60/40 (%) dengan fraksi perbandingan volume *filler* 60/20/20 (%).

Volume cetakan, V_c = 30x30x5 = 4500 mm^3 = 4,5cm^3

Volume matriks, V_m = $\frac{60\%}{100\%} x$ 4,5 cm^3

= 2,70 cm^3

Volume *filler*, V_f = $\frac{40\%}{100\%} x$ 4,5 cm^3

= 1,8 cm^3

Volume serat, V_s = $\frac{60\%}{100\%} x$ 1,8 cm^3

= 1,08 cm^3

Volume Kuningan, V_k = $\frac{20\%}{100\%} x$ 1,8 cm^3

= 0,36 cm^3

Volume MgO, V_{MgO} = $\frac{20\%}{100\%} x$ 1,8 cm^3

= 0,36cm^3

Massa matriks, m_m = $V_m \, x \, \rho_m$

= 2,70 $cm^3 x$ 1,20 $gr/\, cm^3$

= 3,24 gr

Massa serat, m_s = $V_s \, x \, \rho_s$

= 1,08 cm^3x 1,526 gr/ cm^3

= 1,64gr

Massa Kuningan, m_k = $V_k \, x \, \rho_k$

= 0,36 $cm^3 x$ 8,4 $gr/\, cm^3$

= 3,02 gr

Massa MgO, m_{MgO} = V_{MgO} x ρ_{MgO}

= 0,36 cm^3 x 3,58 $gr/\ cm^3$

= 1,29 gr

Variasi Spesimen C Perbandingan fraksi volume matriks dan *filler* 60/40 (%) dengan fraksi perbandingan volume *filler* 70/100/20 (%).

Volume cetakan, V_c = 30x30x5 = 4500 mm^3 = 4,5cm^3

Volume matriks, V_m = $\frac{60\%}{100\%}$ x 4,5 cm^3

= 2,70 cm^3

Volume *filler*, V_f = $\frac{40\%}{100\%}$ x 4,5 cm^3

= 1,8 cm^3

Volume serat, V_s = $\frac{70\%}{100\%}$ x 1,8 cm^3

= 1,26 cm^3

Volume Kuningan, V_k = $\frac{10\%}{100\%}$ x 1,8 cm^3

= 0,18 cm^3

Volume MgO, V_{MgO} = $\frac{20\%}{100\%}$ x 1,8 cm^3

= 0,36cm^3

Massa matriks, m_m = V_m x ρ_m

= 2,70 cm^3 x 1,20 $gr/\ cm^3$

= 3,24 gr

Massa serat, m_s = V_s x ρ_s

= 1,26 cm^3 x 1,526 $gr/\ cm^3$

= 1,92 gr

Massa Kuningan, m_k = V_k x ρ_k

= 0,18 cm^3 x 8,4 $gr/\ cm^3$

= 1,51 gr

Massa MgO, m_{MgO} = V_{MgO} x ρ_{MgO}

= 0,36 cm^3 x 3,58 $gr/\ cm^3$

= 1,29 gr

B. Perhitungan *volume* dan massa spesimen uji tarik

Berikut ini perhitungan yang digunakan untuk menentukan volume dan massa dari spesimen uji tarik komposit:

Diketahui :

Massa jenis serat daun nanas = 1,526 gr/cm^3

Massa jenis *Magnesium Oksida* (Mgo) = 3,58 gr/cm^3

Massa jenis kuningan = 8,4 gr/cm^3

Massa jenis *epoxyresin* = 1,20 gr/cm^3

Dimensi cetakan uji tarik = 6,13 cm^3

Variasi Spesimen A Perbandingan fraksi volume matriks dan *filler* 60/40 (%) dengan fraksi perbandingan volume *filler* 50/30/20 (%).

Volume cetakan, V_c = 6,13 cm^3

Volume matriks, V_m = $\frac{60\%}{100\%} x$ 6,13 cm^3

= 3,67 cm^3

Volume *filler*, V_f = $\frac{40\%}{100\%} x$ 6,13 cm^3

= 2,45 cm^3

Volume serat, V_s = $\frac{50\%}{100\%} x$ 2,45 cm^3

= 1,22 cm^3

Volume Kuningan, V_k = $\frac{30\%}{100\%} x$ 2,45 cm^3

= 0,73 cm^3

$V_{MgO,}$ V_{MgO} = $\frac{20\%}{100\%} x$ 2,45 cm^3

= 0,49 cm^3

Massa matriks, m_m = $V_m \, x \, \rho_m$

= 3,67 $cm^3 x$ 1,20 $gr/\, cm^3$

= 4,40 gr

Massa serat, m_s = $V_s \, x \, \rho_s$

= 1,22 cm^{3}x 1,526gr/ cm^3

= 1,86gr

Massa Kuningan, m_k $= V_k \, x \, \rho_k$

$= 0{,}73 \; cm^3 x \; 8{,}4 \; gr/\, cm^3$

$= 6{,}13 \; gr$

Massa MgO, m_{MgO} $= V_{MgO} \text{ x } \rho_{MgO}$

$= 0{,}49 \; cm^3 x \; 3{,}58 \; gr/\, cm^3$

$= 1{,}75 \; gr$

Variasi Spesimen B Perbandingan fraksi volume matriks dan *filler* 60/40 (%) dengan fraksi perbandingan volume *filler* 60/20/20 (%).

Volume cetakan, V_c $= 6{,}13 \; cm^3$

Volume matriks, V_m $= \frac{60\%}{100\%} x \; 6{,}13 \; cm^3$

$= 3{,}67 \; cm^3$

Volume *filler*, V_f $= \frac{40\%}{100\%} x \; 6{,}13 \; cm^3$

$= 2{,}45 \; cm^3$

Volume serat, V_s $= \frac{60\%}{100\%} x \; 2{,}45 \; cm^3$

$= 1{,}47 \; cm^3$

Volume Kuningan, V_k $= \frac{20\%}{100\%} x \; 2{,}45 \; cm^3$

$= 0{,}49 \; cm^3$

$V_{MgO,}$ V_{MgO} $= \frac{20\%}{100\%} x \; 2{,}45 \; cm^3$

$= 0{,}49 \; cm^3$

Massa matriks, m_m $= V_m \, x \, \rho_m$

$= 3{,}67 \; cm^3 x \; 1{,}20 \; gr/\, cm^3$

$= 4{,}40 \; gr$

Massa serat, m_s $= V_s \, x \, \rho_s$

$= 1{,}47 \text{ cm}^3 \text{x } 1{,}526 \text{gr}/\text{ cm}^3$

$= 2{,}24 \text{ gr}$

Massa Kuningan, m_k $= V_k \, x \, \rho_k$

$= 0{,}49 \; cm^3 x \; 8{,}4 \; gr/\, cm^3$

$= 4{,}11 \; gr$

Massa MgO, m_{MgO} $= V_{MgO} \times \rho_{MgO}$

$= 0{,}49\ cm^3 x\ 3{,}58\ gr/\ cm^3$

$= 1{,}75\ gr$

Variasi Spesimen C Perbandingan fraksi volume matriks dan *filler* 60/40 (%) dengan fraksi perbandingan volume *filler* 70/10/20 (%).

Volume cetakan, V_c $= 6{,}13\ cm^3$

Volume matriks, V_m $= \frac{60\%}{100\%} x\ 6{,}13\ cm^3$

$= 3{,}67\ cm^3$

Volume *filler*, V_f $= \frac{40\%}{100\%} x\ 6{,}13\ cm^3$

$= 2{,}45\ cm^3$

Volume serat, V_s $= \frac{70\%}{100\%} x\ 2{,}45\ cm^3$

$= 1{,}71\ cm^3$

Volume Kuningan, V_k $= \frac{10\%}{100\%} x\ 2{,}45\ cm^3$

$= 0{,}24\ cm^3$

$V_{MgO,}$ V_{MgO} $= \frac{20\%}{100\%} x\ 2{,}45\ cm^3$

$= 0{,}49\ cm^3$

Massa matriks, m_m $= V_m\ x\ \rho_m$

$= 3{,}67\ cm^3 x\ 1{,}20\ gr/\ cm^3$

$= 4{,}40\ gr$

Massa serat, m_s $= V_s\ x\ \rho_s$

$= 1{,}71\ \text{cm}^3 \text{x}\ 1{,}526 \text{gr}/\ \text{cm}^3$

$= 2{,}6$ gr

Massa Kuningan, m_k $= V_k\ x\ \rho_k$

$= 0{,}24\ cm^3 x\ 8{,}4\ gr/\ cm^3$

$= 2{,}01\ gr$

Massa MgO, m_{MgO} $= V_{MgO} \times \rho_{MgO}$

$= 0{,}49\ cm^3 x\ 3{,}58\ gr/\ cm^3$

$= 1{,}75\ gr$

LAMPIRAN 2

LAMPIRAN UJI KEAUSAN

Tabel pemilihan beban dan panjang lintasan uji keausan *ogoshi*

Tabel pemilihan panjang lintasan

Gear ratio D/C	36/108	48/96	72/72	96/48	108/36
Abrasion Distance (m)	66.6	100	200	400	600

Tabel pemilihan beban

Gear ratio E/F	36/108	48/96	72/72	96/48	108/36
Final load (Po) (Kg)	2.12	3.18	6.36	12.72	19.08

Tabel Data uji keausan

Spesimen Variasi 1 (50:30:20)	A1	A2	A3
lebar gores 1	34	25	17
lebar gores 2	15	30	25
lebar gores 3	20	25	30
lebar gores 4	23	23	27
lebar gores 5	18	20	25
Rata-rata lebar goresan	22	24,6	24,8
lebar goresan (mm) pada mikroskop perbesaran 50x	1,16	1,29	1,31
Rata-rata lebar goresan (mm) pada mikroskop perbesaran 50x	1,25		

Spesimen Variasi 2 (60:20:20)	B1	B2	B3
lebar gores 1	24	20	23
lebar gores 2	25	32	30
lebar gores 3	27	27	29
lebar gores 4	27	26	30
lebar gores 5	20	25	24
Rata-rata lebar goresan	24,6	26	27,2
lebar goresan (mm) pada mikroskop perbesaran 50x	1,29	1,37	1,43
Rata-rata lebar goresan (mm) pada mikroskop perbesaran 50x	1,36		

Spesimen Variasi 3 (70:10:20)	C1	C2	C3
lebar gores 1	23	22	28
lebar gores 2	30	30	32
lebar gores 3	29	34	33
lebar gores 4	24	31	35
lebar gores 5	23	29	27
Rata-rata lebar goresan	25,8	29,2	31
lebar goresan (mm) pada mikroskop perbesaran 50x	1,36	1,54	1,63
Rata-rata lebar goresan (mm) pada mikroskop perbesaran 50x	1,51		

Berdasarkan data tabel uji keausan maka nilai keausan spesifik bisa dihitung, sehingga nilai rata-rata keausan spesimen sebagai berikut:

Nilai keausan spesimen uji A :

$$Ws = \frac{B.bo^3}{8.r.Po.Lo} \qquad \left(\frac{mm^2}{kg}\right)$$

$$Ws = \frac{3.1{,}25^3}{8.14.2{,}12.666000} \quad \left(\frac{mm^2}{kg}\right)$$

$Ws =$ 3,72875E-08 (mm^2/kg)

Nilai Keausan Spesimen Uji B :

$$Ws = \frac{B.bo^3}{8.r.Po.Lo} \qquad \left(\frac{mm^2}{kg}\right)$$

$$Ws = \frac{3.1{,}36^3}{8.14.2{,}12.666000} \quad \left(\frac{mm^2}{kg}\right)$$

$Ws =$ 4,824E-08 (mm^2/kg)

Nilai Keausan Spesimen Uji C :

$$Ws = \frac{B.bo^3}{8.r.Po.Lo} \qquad \left(\frac{mm^2}{kg}\right)$$

$$Ws = \frac{3.1{,}51^3}{8.14.2{,}12.666000} \quad \left(\frac{mm^2}{kg}\right)$$

$Ws =$ 6,5157E-08 (mm^2/kg)

Untuk keseluruhan hasil perhitungan ditunjukkan pada tabel dibawah ini:

Tabel Hasil perhitungan nilai dari keausan spesifik

Benda uji		jarak piringan yang ditempuh Lo (mm)	lebar hasil goresan bo (mm)	bo^3	beban Po (kg)	jari-jari r (mm)	tebal B (mm)	Nilai keausan spesifik Ws (mm^2/kg)
A	1	666000	1,16	1,55	2,12	14	3	2,9451E-08
	2	666000	1,29	2,17	2,12	14	3	4,11754E-08
	3	666000	1,31	2,22	2,12	14	3	4,21878E-08
	Rata-rata	666000	1,25	1,97	2,12	14	3	3,72875E-08
B	1	666000	1,29	2,17	2,12	14	3	4,11754E-08
	2	666000	1,37	2,56	2,12	14	3	4,8613E-08
	3	666000	1,43	2,93	2,12	14	3	5,56595E-08
	Rata-rata	666000	1,36	2,54	2,12	14	3	4,824E-08
C	1	666000	1,36	2,50	2,12	14	3	4,74998E-08
	2	666000	1,54	3,63	2,12	14	3	6,88622E-08
	3	666000	1,63	4,34	2,12	14	3	8,23981E-08
	Rata-rata	666000	1,51	3,43	2,12	14	3	6,51574E-08

LAMPIRAN 3

LAMPIRAN UJI KEKERASAN

Tabel Data Hasil Uji Kekerasan

Spesimen Variasi 1 (50:30:20)	A	A
Diameter injakan 1	17	18
Diameter injakan 2	19	18
Diameter injakan 3	19	20
Diameter injakan 4	17	20
Diameter injakan 5	18	18
Rata-rata Diameter injakan	18	18,8
Diameter injakan (mm) pada mikroskop perbesaran 50x	0,95	0,99
Rata-rata Diameter injakan (mm) pada mikroskop perbesaran 50x	0,97	
	B	B
Spesimen Variasi 2 (60:20:20)	16,5	19
Diameter injakan 1	16	19
Diameter injakan 2	19	19
Diameter injakan 3	19	17
Diameter injakan 4	19	18
Diameter injakan 5	17,9	18,4
Rata-rata Diameter injakan	0,94	0,97
Diameter injakan (mm) pada mikroskop perbesaran 50x Rata-rata Diameter injakan (mm) pada mikroskop perbesaran 50x	0,96	
	C	C
Spesimen Variasi 3 (70:10:20)	18	16
Diameter injakan 1	19	17
Diameter injakan 2	19	16
Diameter injakan 3	18	16,5
Diameter injakan 4	15	19
Diameter injakan 5	17,8	16,9
Rata-rata Diameter injakan	0,94	0,89
Diameter injakan (mm) pada mikroskop perbesaran 50x	0,91	

Nilai kekerasan rata-rata spesimen A:

$$HB = \frac{2F}{\pi D(D-\sqrt{D^2-d^2})} \qquad (\text{kg/mm}^2)$$

$$HB = \frac{2.15{,}625}{\pi.2{,}5(2{,}5-\sqrt{2{,}5^2-0{,}97^2})}$$

$$HB = 20{,}41\ (\text{kg/mm}^2)$$

Nilai kekerasan rata-rata spesimen B :

$$HB = \frac{2F}{\pi D(D-\sqrt{D^2-d^2})} \qquad (\text{kg/mm}^2)$$

$$HB = \frac{2.15{,}625}{\pi.2{,}5(2{,}5-\sqrt{2{,}5^2-0{,}96^2})}$$

$$HB = 20{,}99\ (\text{kg/mm}^2)$$

Nilai kekerasan rata-rata spesimen C :

$$HB = \frac{2F}{\pi D(D-\sqrt{D^2-d^2})} \qquad (\text{kg/mm}^2)$$

$$HB = \frac{2.15{,}625}{\pi.2{,}5(2{,}5-\sqrt{2{,}5^2-0{,}91^2})}$$

$$HB = 23{,}08\ (\text{kg/mm}^2)$$

Untuk keseluruhan hasil perhitungan dapat dilihat pada tabel dibawah ini :

Tabel Hasil Pengolaham Data Uji Kekerasan

No	Diameter injakan (mm)	Gaya tekan (F) (kg)	Penetrator diameter (D) (mm)	BHN
1	0,95	15,625	2,5	21,34
2	0,99	15,625	2,5	19,49
Rata-rata	0,97	15,625	2,5	20,41
Standar deviasi				1,31
1	0,94	15,625	2,5	21,59
2	0,97	15,625	2,5	20,38
Rata-rata	0,96	15,625	2,5	20,99
Standar deviasi				1,31
1	0,94	15,625	2,5	21,84
2	0,89	15,625	2,5	24,32
Rata-rata	0,91	15,625	2,5	23,08
Standar deviasi				1,75

LAMPIRAN 4

LAMPIRAN UJI TARIK

Tabel data pengujian kekuatan tarik material komposit serat nanas/epoksi

	No	LEBAR	TEBAL	Fmax Lm (Kgf)	Fmax Lm (N)	Measurement travel end (mm)
A	1	6,25	4,40	95,341	935,01	4,3
	2	6,29	4,70	85,229	835,84	3,55
	3	6,23	4,30	84,892	832,54	3,8
	4	6,29	4,40	85,66	840,07	3,3
	5	6,22	4,30	102,28	1003,06	4,21
	Rata-rata	6,26	4,42	90,6804	889,304	3,832
B	No	LEBAR	TEBAL	Fmax Lm (Kgf)	Fmax Lm (N)	Measurement travel end (mm)
	1	6,26	4,32	95,03	931,96	3,88
	2	6,27	4,18	94,52	926,95	3,79
	3	6,3	4,36	117,33	1150,63	4,38
	4	6,21	4,3	108,27	1061,76	3,96
	5	6,31	4,25	85,68	840,26	3,63
	Rata-rata	6,27	4,282	100,1644	982,312	3,928
C	No	LEBAR	TEBAL	Fmax Lm (Kgf)	Fmax Lm (N)	Measurement travel end (mm)
	1	6,3	4,17	103,98	1019,73	3,55
	2	6,27	4,3	106,034	1039,88	4,13
	3	6,27	4,3	81,414	798,43	3,55
	4	6,26	4,35	113,012	1108,31	4,21
	5	6,25	4,2	104,981	1029,55	4,13
	Rata-rata	6,27	4,264	101,8842	999,18	3,914

Berikut perhitungan kuat tarik material komposit serat nanas/epoksi :

Besar kuat tarik rata-rata spesimen A:

$\sigma = \frac{P}{A}$ (Mpa)

$\sigma = \frac{889{,}304\ (N)}{6{,}26(mm)\ x\ 4{,}42\ (mm)}$

$\sigma = 32{,}16$ (Mpa)

Besar kuat tarik rata-rata spesimen B:

$\sigma = \frac{P}{A}$ (Mpa)

$\sigma = \frac{982{,}31\ (N)}{6{,}27\ (mm)\ x\ 4{,}282\ (mm)}$

$\sigma = 36{,}59$ (Mpa)

Besar kuat tarik rata-rata spesimen C:

$\sigma = \frac{P}{A}$ (Mpa)

$\sigma = \frac{999{,}18\ (N)}{6{,}27\ (mm)\ x\ 4{,}264\ (mm)}$

$\sigma = 37{,}38$ (Mpa)

Berikut perhitungan regangan tarik material komposit serat nanas/epoksi

Besar regangan rata-rata spesimen A:

$\varepsilon = \frac{\Delta L}{L}\ x\ 100\%$

$\varepsilon = \frac{3{,}09\ mm}{25\ mm}\ x\ 100\ \%$

$\varepsilon = 12{,}37\ \%$

Besar regangan rata-rata spesimen B:

$\varepsilon = \frac{\Delta L}{L}\ x\ 100\%$

$\varepsilon = \frac{3{,}11\ mm}{25\ mm}\ x\ 100\ \%$

$\varepsilon = 12{,}43\ \%$

Besar regangan rata-rata spesimen C:

$\varepsilon = \frac{\Delta L}{L}\ x\ 100\%$

$\varepsilon = \frac{3{,}17\ mm}{25\ mm}\ x\ 100\ \%$

$\varepsilon = 12{,}70\ \%$

Berikut perhitungan modulus elastisitas tarik komposit serat nanas/epoksi :

Besar modulus elastisitas rata-rata spesimen A:

$$E = \frac{\Delta\sigma}{\Delta\varepsilon} = \frac{\Delta F/A}{\Delta Lf/L} \text{ (Mpa)}$$

$$E = \frac{\Delta\sigma}{\Delta\varepsilon} = \frac{400/6{,}26.4{,}42}{0{,}9/25}$$

$$E = 407{,}34 \text{ (Mpa)}$$

Besar modulus elastisitas rata-rata spesimen B:

$$E = \frac{\Delta\sigma}{\Delta\varepsilon} = \frac{\Delta F/A}{\Delta Lf/L} \text{ (Mpa)}$$

$$E = \frac{\Delta\sigma}{\Delta\varepsilon} = \frac{380/6{,}27.4{,}82}{0{,}88/25}$$

$$E = 403{,}19 \text{ (Mpa)}$$

Besar modulus elastisitas rata-rata spesimen C:

$$E = \frac{\Delta\sigma}{\Delta\varepsilon} = \frac{\Delta F/A}{\Delta Lf/L} \text{ (Mpa)}$$

$$E = \frac{\Delta\sigma}{\Delta\varepsilon} = \frac{400/6{,}27.4{,}26}{1/25}$$

$$E = 378{,}38 \text{ (Mpa)}$$

Untuk keseluruhan hasil perhitungan ditunjukan pada tabel dibawah ini:

Data Hasil Perhitungan Uji Tarik

spesimen	NO	LEBAR	TEBAL	L STANDAR ASTM D 638-02 TYPE IV	L0 (mm)	Lf (mm)	ΔL (mm)	Nilai Pembebanan (kgf)	F (N)	σ (Mpa)	ε (%)	E (Mpa)
A	A1	6,25	4,4	25	0,9	4,3	3,40	95,34	935,01	34,00	13,60	427,81
	A2	6,29	4,7	25	0,6	3,55	2,95	85,23	835,84	28,27	11,80	356,06
	A3	6,23	4,3	25	0,9	3,8	2,9	84,89	832,54	31,08	11,60	466,61
	A4	6,29	4,4	25	0,4	3,3	2,9	85,66	840,07	30,35	11,60	361,32
	A5	6,22	4,3	25	0,9	4,21	3,31	102,28	1003,06	37,50	13,24	424,87
Minimun		6,22	4,3	25	0,4	3,3	2,9	84,89	832,54	28,27	11,60	356,06
Maximum		6,29	4,7	25	0,9	4,3	3,4	102,28	1003,06	37,50	13,60	466,61
Rata-Rata		6,26	4,42	25	0,74	3,83	3,09	90,68	889,30	32,16	12,37	407,34
standar deviasi					0,23	0,43	0,24	7,82	76,70	3,59	0,97	47,40
B	B1	6,26	4,32	25	0,6	3,88	3,28	95,03	931,96	34,46	13,12	369,78
	B2	6,27	4,18	25	0,8	3,79	2,99	94,52	926,95	35,37	11,96	423,95
	B3	6,3	4,36	25	1,1	4,38	3,28	117,33	1150,63	41,89	13,12	404,51
	B4	6,21	4,3	25	0,8	3,96	3,16	108,27	1061,76	39,76	12,64	468,11
	B5	6,31	4,25	25	0,8	3,63	2,83	85,68	840,26	31,33	11,32	349,59
Minimun		6,21	4,18	25	0,60	3,63	2,83	85,68	840,26	31,33	11,32	349,59
Maximum		6,31	4,36	25	1,10	4,38	3,28	117,33	1150,63	41,89	13,12	468,11
Rata-Rata		6,27	4,28	25	0,82	3,93	3,11	100,16	982,31	36,59	12,43	403,19
standar deviasi					0,18	0,28	0,20	12,53	122,90	4,24	0,78	46,47
C	C1	6,3	4,17	25	0,6	3,55	2,95	103,98	1019,73	38,82	11,80	422,94
	C2	6,27	4,3	25	0,9	4,13	3,23	106,03	1039,88	38,57	12,92	370,91

	C3	6,27	4,3	25	0,4	3,55	3,15	81,41	798,43	29,61	12,60	309,09
	C4	6,26	4,35	25	0,8	4,21	3,41	113,01	1108,31	40,70	13,64	408,03
	C5	6,25	4,2	25	1,0	4,13	3,13	104,98	1029,55	39,22	12,52	380,95
Minimun		6,25	4,17	25	0,40	3,55	2,95	81,41	798,43	29,61	11,80	309,09
Maximum		6,30	4,35	25	1,00	4,21	3,41	113,01	1108,31	40,70	13,64	422,94
Rata-Rata		6,27	4,26	25	0,74	3,91	3,17	101,88	999,18	37,38	12,70	378,38
standar deviasi					0,24	0,33	0,17	11,98	117,49	4,42	0,67	43,96

LAMPIRAN 5

Serat Tunggal (Serat Nanas)

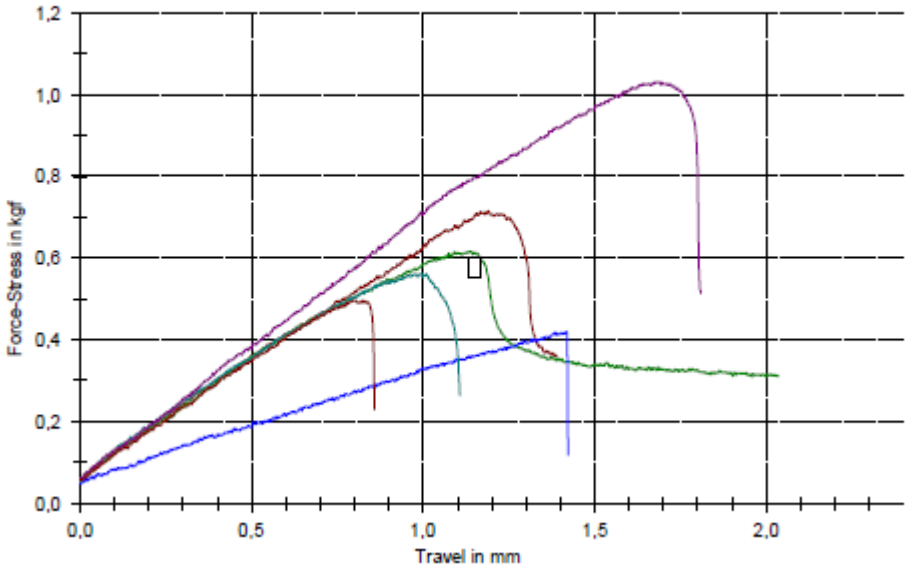
Parameter table:

Headline	: Serat Tunggal (Serat Nanas)	Evaluat. method	: M (Automatic A, B or C)
Customer	: 1915/VIII/17	Specimen holders:	
Tester	: L TRIYONO	Extensometer	:
Material	: Serat Tunggal Nanas	Load cell	:
Test standard	: ASTM D 3379		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	0,715	1,39
	2	0,617	2,04
	3	0,420	1,42
	4	0,561	1,11
	5	1,031	1,81
	6	0,497	0,86

Series graph:



LAMPIRAN 6

UJI TARIK KOMPOSIT SERAT NANAS

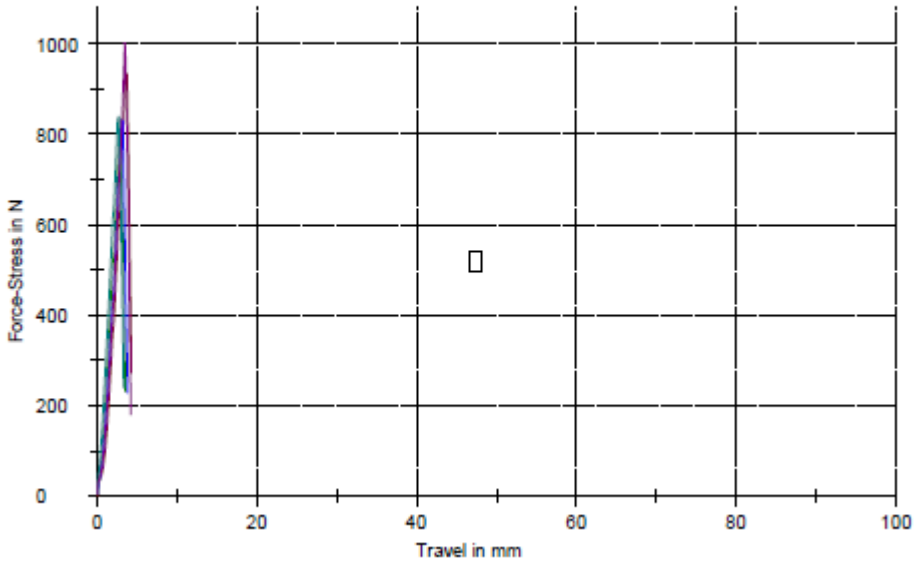
Parameter table:

Headline	: UJI TARIK KOMPOSIT SERAT NANAS
Customer	: 548-550/iii/18
Tester	: L TRIYONO
Material	: KOMPOSIT SERAT NANAS
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
	1	95,341	4,30
	2	85,229	3,55
	3	84,892	3,80
	4	85,660	3,30
	5	102,280	4,21

Series graph:



UJI TARIK KOMPOSIT SERAT NANAS

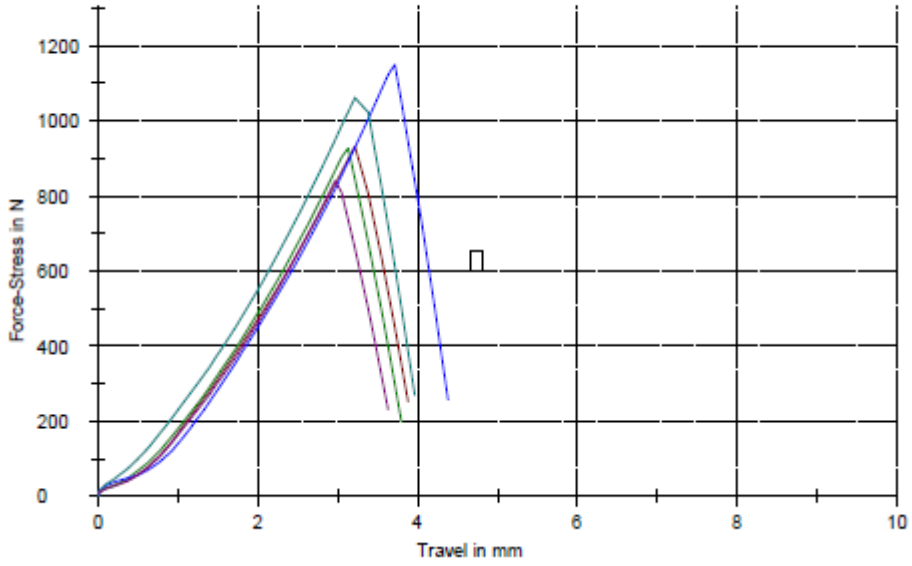
Parameter table:

Headline	: UJI TARIK KOMPOSIT SERAT NANAS
Customer	: 548-550/iii/18
Tester	: L TRIYONO
Material	: KOMPOSIT SERAT NANAS B1-B5
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
	1	95,030	3,88
	2	94,519	3,79
	3	117,327	4,38
	4	108,266	3,96
	5	85,680	3,63

Series graph:



UJI TARIK KOMPOSIT SERAT NANAS

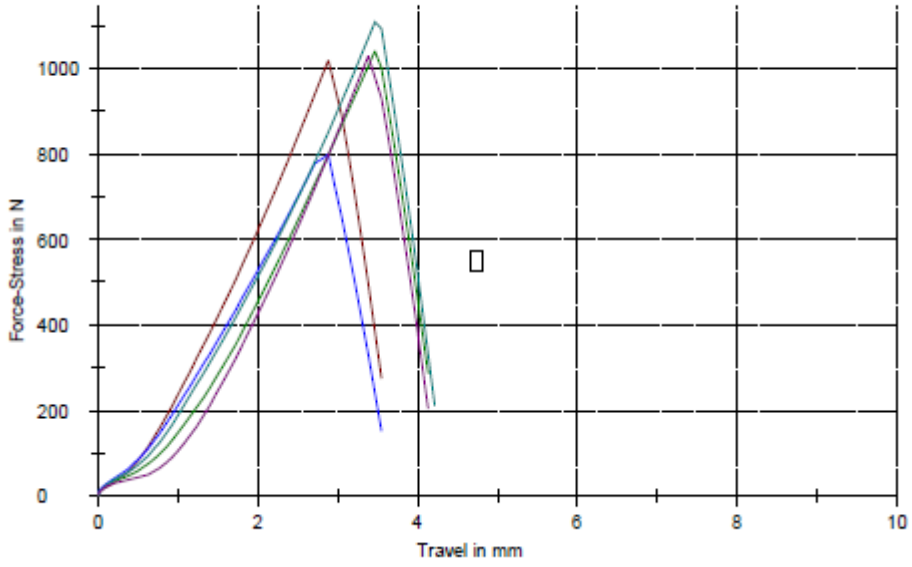
Parameter table:

Headline	: UJI TARIK KOMPOSIT SERAT NANAS
Customer	: 548-550/iii/18
Tester	: L TRIYONO
Material	: KOMPOSIT SERAT NANAS C1-C5
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
	1	103,980	3,55
	2	106,034	4,13
	3	81,414	3,55
	4	113,012	4,21
	5	104,981	4,13

Series graph:



LAMPIRAN 7