

LAMPIRAN 1

Perhitungan Fraksi Volume Komposit

Berikut ini adalah perhitungan yang digunakan untuk menentukan massa komposit:

Diketahui:

$$\text{Massa jenis serat kenaf} = 1,45 \text{ gr/cm}^3$$

$$\text{Massa jenis polypropilene} = 0,92 \text{ gr/cm}^3$$

$$\text{Massa jenis HDPE} = 0,96 \text{ gr/cm}^3$$

$$\text{Dimensi cetakan : Panjang (P)} = 17 \text{ cm}$$

$$\text{Lebar (l)} = 9 \text{ cm}$$

$$\text{Tebal (t)} = 0,4 \text{ cm}$$

Perbandingan fraksi volume matriks dan serat adalah 70% : 30%, dengan variasi perbandingan fraksi volume (2PP + 1HDPE).

$$\begin{aligned} \text{Volume cetakan, } V_c &= p \times l \times t \\ &= 17 \text{ cm} \times 9 \text{ cm} \times 0,4 \text{ cm} \\ &= 61,2 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} \text{Volume matriks, } V_m &= \frac{V_m}{100} \times V_c \\ &= \frac{70\%}{100} \times 61,2 \text{ cm}^3 \\ &= 42,82 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} \text{Volume serat kenaf, } V_s &= \frac{V_s}{100} \times V_c \\ &= \frac{30}{100} \times 61,2 \text{ cm}^3 \\ &= 18,36 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} \text{Massa serat kenaf, } m_{kenaf} &= V_{kenaf} \times \rho_{kenaf} \\ &= 18,36 \text{ cm}^3 \times 1,45 \text{ gr/cm}^3 \end{aligned}$$

$$\begin{aligned}
&= 26,62 \text{ gr} \\
\text{Volume matriks PP, } V_{PP} &= \frac{2}{3} \times 42,82 \text{ cm}^3 \\
&= 28,56 \text{ cm}^3 \\
\text{Volume matriks HD, } V_{HD} &= \frac{1}{3} \times 42,82 \text{ cm}^3 \\
&= 14,28 \text{ cm}^3 \\
\text{Massa PP, } m_{PP} &= V_{PP} \times \rho_{PP} \\
&= 28,56 \text{ cm}^3 \times 0,92 \text{ gr/cm}^3 \\
&= 26,27 \text{ gr} \\
\text{Massa HDPE, } m_{HDPE} &= V_{HDPE} \times \rho_{HDPE} \\
&= 14,28 \text{ cm}^3 \times 0,96 \text{ gr/cm}^3 \\
&= 13,70 \text{ gr}
\end{aligned}$$

Perbandingan fraksi volume matriks dan serat adalah 70% : 30%, dengan variasi perbandingan fraksi volume (1PP + 1HDPE).

$$\begin{aligned}
\text{Volume cetakan, } V_c &= p \times l \times t \\
&= 17 \text{ cm} \times 9 \text{ cm} \times 0,4 \text{ cm} \\
&= 61,2 \text{ cm}^3 \\
\text{Volume matriks, } V_m &= \frac{V_m}{100} \times V_c \\
&= \frac{70\%}{100} \times 61,2 \text{ cm}^3 \\
&= 42,82 \text{ cm}^3 \\
\text{Volume serat kenaf, } V_s &= \frac{V_s}{100} \times V_c \\
&= \frac{30}{100} \times 61,2 \text{ cm}^3 \\
&= 18,36 \text{ cm}^3 \\
\text{Massa serat kenaf, } m_{kenaf} &= V_{kenaf} \times \rho_{kenaf} \\
&= 18,36 \text{ cm}^3 \times 1,45 \text{ gr/cm}^3 \\
&= 26,62 \text{ gr}
\end{aligned}$$

$$\begin{aligned}
\text{Volume matriks PP, } V_{PP} &= \frac{1}{2} \times 42,82 \text{ cm}^3 \\
&= 21,41 \text{ cm}^3 \\
\text{Volume matriks HD, } V_{HD} &= \frac{1}{2} \times 42,82 \text{ cm}^3 \\
&= 21,41 \text{ cm}^3 \\
\text{Massa PP, } m_{PP} &= V_{PP} \times \rho_{PP} \\
&= 21,41 \text{ cm}^3 \times 0,92 \text{ gr/cm}^3 \\
&= 19,69 \text{ gr} \\
\text{Massa HDPE, } m_{HDPE} &= V_{HDPE} \times \rho_{HDPE} \\
&= 21,41 \text{ cm}^3 \times 0,96 \text{ gr/cm}^3 \\
&= 20,55 \text{ gr}
\end{aligned}$$

Perbandingan fraksi volume matriks dan serat adalah 70% : 30%, dengan variasi perbandingan fraksi volume (1PP + 2HDPE).

$$\begin{aligned}
\text{Volume cetakan, } V_c &= p \times l \times t \\
&= 17 \text{ cm} \times 9 \text{ cm} \times 0,4 \text{ cm} \\
&= 61,2 \text{ cm}^3 \\
\text{Volume matriks, } V_m &= \frac{V_m}{100} \times V_c \\
&= \frac{70\%}{100} \times 61,2 \text{ cm}^3 \\
&= 42,82 \text{ cm}^3 \\
\text{Volume serat kenaf, } V_s &= \frac{V_s}{100} \times V_c \\
&= \frac{30}{100} \times 61,2 \text{ cm}^3 \\
&= 18,36 \text{ cm}^3 \\
\text{Massa serat kenaf, } m_{kenaf} &= V_{kenaf} \times \rho_{kenaf} \\
&= 18,36 \text{ cm}^3 \times 1,45 \text{ gr/cm}^3 \\
&= 26,62 \text{ gr} \\
\text{Volume matriks PP, } V_{PP} &= \frac{1}{3} \times 42,82 \text{ cm}^3 \\
&= 14,28 \text{ cm}^3
\end{aligned}$$

$$\begin{aligned}
\text{Volume matriks HD, } V_{HD} &= \frac{2}{3} \times 42,82 \text{ cm}^3 \\
&= 28,56 \text{ cm}^3 \\
\text{Massa PP, } m_{PP} &= V_{PP} \times \rho_{PP} \\
&= 14,28 \text{ cm}^3 \times 0,92 \text{ gr/cm}^3 \\
&= 19,69 \text{ gr} \\
\text{Massa HDPE, } m_{HDPE} &= V_{HDPE} \times \rho_{HDPE} \\
&= 28,56 \text{ cm}^3 \times 0,96 \text{ gr/cm}^3 \\
&= 27,41 \text{ gr}
\end{aligned}$$

Perbandingan fraksi volume matriks dan serat adalah 70% : 30%, dengan variasi perbandingan Kenaf/PP

$$\begin{aligned}
\text{Volume cetakan, } V_c &= p \times l \times t \\
&= 17 \text{ cm} \times 9 \text{ cm} \times 0,4 \text{ cm} \\
&= 61,2 \text{ cm}^3 \\
\text{Volume matriks, } V_m &= \frac{V_m}{100} \times V_c \\
&= \frac{70\%}{100} \times 61,2 \text{ cm}^3 \\
&= 42,82 \text{ cm}^3 \\
\text{Volume serat kenaf, } V_s &= \frac{V_s}{100} \times V_c \\
&= \frac{30}{100} \times 61,2 \text{ cm}^3 \\
&= 18,36 \text{ cm}^3 \\
\text{Massa serat kenaf, } m_{kenaf} &= V_{kenaf} \times \rho_{kenaf} \\
&= 18,36 \text{ cm}^3 \times 1,45 \text{ gr/cm}^3 \\
&= 26,62 \text{ gr} \\
\text{Massa PP, } m_{PP} &= V_m \times \rho_{PP} \\
&= 42,84 \times 0,92 \text{ gr/cm}^3 \\
&= 39,41 \text{ gr}
\end{aligned}$$

Perbandingan fraksi volume matriks dan serat adalah 70% : 30%, dengan variasi perbandingan Kenaf/HDPE.

$$\begin{aligned}\text{Volume cetakan, } V_c &= p \times l \times t \\ &= 17 \text{ cm} \times 9 \text{ cm} \times 0,4 \text{ cm} \\ &= 61,2 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Volume matriks, } V_m &= \frac{V_m}{100} \times V_c \\ &= \frac{70\%}{100} \times 61,2 \text{ cm}^3 \\ &= 42,82 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Volume serat kenaf, } V_s &= \frac{V_s}{100} \times V_c \\ &= \frac{30}{100} \times 61,2 \text{ cm}^3 \\ &= 18,36 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Massa serat kenaf, } m_{kenaf} &= V_{kenaf} \times \rho_{kenaf} \\ &= 18,36 \text{ cm}^3 \times 1,45 \text{ gr/cm}^3 \\ &= 26,62 \text{ gr}\end{aligned}$$

$$\begin{aligned}\text{Massa PP, } m_{PP} &= V_m \times \rho_{HDPE} \\ &= 42,84 \times 0,96 \text{ gr/cm}^3 \\ &= 41,12 \text{ gr}\end{aligned}$$

LAMPIRAN 2

Perhitungan ketangguhan impact

kenaf/(PP + HDPE) 2:1	sudut (b) °	cos (b)	energi yang diserap (W) Joule	ketangguhan impact Joule/mm ²
spesimen 1	143	-0,80	0,83	0,021
spesimen 2	144	-0,81	0,75	0,019
spesimen 3	143	-0,80	0,83	0,021
spesimen 4	142	-0,79	0,92	0,023
spesimen 5	141	-0,78	1,01	0,025
rata - rata	142,6	-0,79	0,87	0,022

kenaf/(PP + HDPE) 1:1	sudut (b) °	cos (b)	energi yang diserap (W) Joule	ketangguhan impact Joule/mm ²
Spesimen 1	142	-0,79	0,92	0,023
Spesimen 2	141	-0,78	1,01	0,025
Spesimen 3	142	-0,79	0,92	0,023
Spesimen 4	143	-0,80	0,83	0,021
Spesimen 5	142	-0,79	0,92	0,023
rata - rata	142	-0,79	0,92	0,023

kenaf/(PP + HDPE) 1:2	sudut (b) °	cos (b)	energi yang diserap (W) Joule	ketangguhan impact Joule/mm ²
Spesimen 1	141	-0,78	1,01	0,025
Spesimen 2	138	-0,74	1,29	0,032
Spesimen 3	140	-0,77	1,10	0,028
Spesimen 4	139	-0,75	1,20	0,030
Spesimen 5	141	-0,78	1,01	0,025
rata - rata	139,8	-0,76	1,12	0,028

Kenaf/PP	sudut (b) °	cos (b)	energi yang diserap (W) Joule	ketangguhan impak Joule/mm ²
Spesimen 1	145	-0,82	0,66	0,017
Spesimen 2	144	-0,81	0,75	0,019
Spesimen 3	146	-0,83	0,58	0,014
Spesimen 4	145	-0,82	0,66	0,017
Spesimen 5	145	-0,82	0,66	0,017
rata-rata	145	-0,82	0,66	0,017

kenaf/HDPE	sudut (b) °	cos (b)	energi yang diserap (W) Joule	ketangguhan impak Joule/mm ²
Spesimen 1	139	-0,75	1,20	0,030
Spesimen 2	139	-0,75	1,20	0,030
Spesimen 3	138	-0,74	1,29	0,032
Spesimen 4	139	-0,75	1,20	0,030
Spesimen 5	140	-0,77	1,10	0,028
rata - rata	139	-0,75	1,20	0,030

LAMPIRAN 3

Perhitungan kekerasan

Spesimen	Kenaf/(PP + HDPE) 2:1	Kenaf/(PP + HDPE) 1:1	Kenaf/(PP + HDPE) 1:2	Kenaf/PP	Kenaf/HDPE
Diameter hasil 1	22	25	24	22	26
Diameter hasil 2	23	24	25	21	26
Diameter hasil 3	24	26	24	22	27
Diameter hasil 4	22	24	26	22	27
Diameter hasil 5	23	24	26	21	26
Rata-rata	22,8	24,6	25	21,6	26,4
Pebesaran 50 X	1,20	1,29	1,32	1,14	1,39

No	Diameter hasil (mm)	Gaya tekan (F) (kg)	Diameter indenter (D) (mm)	HBN
1	1,14	15,625	2,5	14,55
2	1,39	15,625	2,5	9,44
3	1,20	15,625	2,5	12,97
4	1,29	15,625	2,5	11,01
5	1,32	15,625	2,5	10,63
Standar deviasi				2,03