

LAMPIRAN 1

Perhitungan kadar konstituen

Perhitungan fraksi volume serat 0%, 10%, 20%, dan 40% dapat dilihat sebagai berikut :

$$\text{Dimensi cetakan} \quad \text{Panjang (p)} = 25 \text{ cm}$$

$$\text{Lebar (l)} = 15 \text{ cm}$$

$$\text{Tinggi (t)} = 0,5 \text{ cm}$$

Volume cetakan (Vc)

$$\begin{aligned} Vc &= p \times l \times t \\ &= 25\text{cm} \times 15\text{cm} \times 0,5\text{cm} \\ &= 187,5 \text{ cm} \end{aligned}$$

1. Perhitungan variasi fraksi volume serat 0% dapat dilihat sebagai berikut :

$$\text{❖ Massa jenis serat sabut kelapa (pf)} = 1,15 \text{ gr/cm}^3$$

$$\text{❖ Massa jenis resin (pm)} = 1,13 \text{ gr/cm}^3$$

$$\text{❖ Volume cetakan (Vc)} = 187,5 \text{ cm}$$

$$\text{❖ Massa matrik (Mmatrik)}$$

$$Mmatrik = Mresin + Mkatalis$$

$$= 100\% + 1\%$$

$$Mmatrik = 101\%$$

a. Volume serat (Vf)

$$Vf = \frac{Vc \times \text{variasi fraksi volume serat}}{100\%}$$

$$= \frac{187,5 \times 0\%}{100\%}$$

$$Vf = 0 \text{ cm}^3$$

b. Massa serat (Mf)

$$(Mf) = Vf \times pf$$

$$= 0 \text{ cm}^3 \times 1.15 \text{ gr/cm}^3$$

$$(Mf) = 0 \text{ gr}$$

c. Volume matrik (V_{matrik})

$$\begin{aligned}(V_{matrik}) &= \frac{V_c \times (100\% - \text{Variasi fraksi volume serat})}{100\%} \\ &= \frac{187,5 \text{ cm}^3 \times (100\% - 0\%)}{100\%} \\ &= 187,5 \text{ cm}^3\end{aligned}$$

d. Massa matrik (M_{matrik})

$$\begin{aligned}M_{matrik} &= V_{matrik} \times \rho_{matrik} \\ &= 187,5 \text{ cm}^3 \times 1.13 \text{ gr/cm}^3 \\ M_{matrik} &= 211,87 \text{ gr}\end{aligned}$$

e. Massa resin (M_{resin})

$$\begin{aligned}&= \frac{100\%}{101\%} \times 211,87 \text{ gr} \\ M_{resin} &= 209,72 \text{ gr}\end{aligned}$$

f. Massa katalis ($M_{katalis}$)

$$\begin{aligned}M_{katalis} &= M_{resin} \times 1\% \\ &= 209,72 \text{ gr} \times 1\% \\ &= 2.09 \text{ gr}\end{aligned}$$

2. Perhitungan variasi fraksi volume serat 10% dapat dilihat sebagai berikut :

- ❖ Massa jenis serat sabut kelapa (ρ_f) = 1,15 gr/cm³
- ❖ Massa jenis resin (ρ_m) = 1,13 gr/cm³
- ❖ Volume cetakan (V_c) = 187,5 cm³
- ❖ Massa matrik (M_{matrik})

$$\begin{aligned}M_{matrik} &= M_{resin} + M_{katalis} \\ &= 100\% + 1\% \\ M_{matrik} &= 101\%\end{aligned}$$

a. Volume serat (V_f)

$$\begin{aligned}V_{f_1} &= \frac{V_c \times \text{variasi fraksi volume serat}}{100\%} \\ &= \frac{187,5 \times 10\%}{100\%} \\ V_{f_1} &= 18,75 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}
 Vf_2 &= Vf_1 \times \frac{t1}{t2} \\
 &= 18,75 \times \frac{0,5}{0,52} \\
 &= 18,02 \text{ cm}^3
 \end{aligned}$$

b. Massa serat (Mf)

$$\begin{aligned}
 (Mf) &= Vf \times pf \\
 &= 18,02 \text{ cm}^3 \times 1,15 \text{ gr/cm}^3 \\
 (Mf) &= 20,73 \text{ gr}
 \end{aligned}$$

c. Volume matrik (Vmatrik)

$$\begin{aligned}
 (Vmatrik) &= \frac{Vc \times (100\% - \text{Variasi fraksi volume serat})}{100\%} \\
 &= \frac{187,5 \text{ cm}^3 \times (100\% - 10\%)}{100\%} \\
 &= 168,75 \text{ cm}^3
 \end{aligned}$$

d. Massa matrik (Vmatrik)

$$\begin{aligned}
 Mmatrik &= Vmatrik \times p \text{ matrik} \\
 &= 168,75 \text{ cm}^3 \times 1,13 \text{ gr/cm}^3 \\
 Mmatrik &= 190,68 \text{ gr}
 \end{aligned}$$

e. Massa resin (Mresin)

$$= \frac{100\%}{101\%} \times 190,68 \text{ gr}$$

$$Mresin = 188,79 \text{ gr}$$

f. Massa katalis (Mkatalis)

$$\begin{aligned}
 Mkatalis &= Mresin \times 1\% \\
 &= 188,79 \text{ gr} \times 1\% \\
 &= 1,87 \text{ gr}
 \end{aligned}$$

3. Perhitungan variasi fraksi volume serat 20% dapat dilihat sebagai berikut :

- ❖ Massa jenis serat sabut kelapa (pf) = 1,15 gr/cm³
- ❖ Massa jenis resin (pm) = 1,13 gr/cm³
- ❖ Volume cetakan (Vc) = 187,5 cm
- ❖ Massa matrik (Mmatrik)

$$M_{\text{matrik}} = M_{\text{resin}} + M_{\text{katalis}}$$

$$= 100\% + 1\%$$

$$M_{\text{matrik}} = 101\%$$

a. Volume serat (V_f)

$$V_{f1} = \frac{V_c \times \text{variasi fraksi volume serat}}{100\%}$$

$$= \frac{187,5 \times 20\%}{100\%}$$

$$V_{f1} = 37,5 \text{ cm}^3$$

$$V_{f2} = V_{f1} \times \frac{t_1}{t_2}$$

$$= 37,5 \times \frac{0,5}{0,53}$$

$$= 35,37 \text{ cm}^3$$

b. Massa serat (M_f)

$$(M_f) = V_f \times \rho_f$$

$$= 35,37 \text{ cm}^3 \times 1,15 \text{ gr/cm}^3$$

$$(M_f) = 40,67 \text{ gr}$$

c. Volume matrik (V_{matrik})

$$(V_{\text{matrik}}) = \frac{V_c \times (100\% - \text{Variasi fraksi volume serat})}{100\%}$$

$$= \frac{187,5 \text{ cm}^3 \times (100\% - 20\%)}{100\%}$$

$$= 150 \text{ cm}^3$$

d. Massa matrik (V_{matrik})

$$M_{\text{matrik}} = V_{\text{matrik}} \times \rho_{\text{matrik}}$$

$$= 150 \text{ cm}^3 \times 1,13 \text{ gr/cm}^3$$

$$M_{\text{matrik}} = 169,5 \text{ gr}$$

e. Massa resin (M_{resin})

$$= \frac{100\%}{101\%} \times 169,5 \text{ gr}$$

$$M_{\text{resin}} = 167,82 \text{ gr}$$

f. Massa katalis (Mkatalis)

$$\begin{aligned} \text{Mkatalis} &= \text{Mresin} \times 1\% \\ &= 167,82 \text{ gr} \times 1\% \\ &= 1,67 \text{ gr} \end{aligned}$$

4. Perhitungan variasi fraksi volume serat 30% dapat dilihat sebagai berikut :

- ❖ Massa jenis serat sabut kelapa (pf) = 1,15 gr/cm³
- ❖ Massa jenis resin (pm) = 1,13 gr/cm³
- ❖ Volume cetakan (Vc) = 187,5 cm
- ❖ Massa matrik (Mmatrik)

$$\begin{aligned} \text{Mmatrik} &= \text{Mresin} + \text{Mkatalis} \\ &= 100\% + 1\% \\ \text{Mmatrik} &= 101\% \end{aligned}$$

a. Volume serat (Vf)

$$\begin{aligned} \text{Vf}_1 &= \frac{\text{Vc} \times \text{variasi fraksi volume serat}}{100\%} \\ &= \frac{187,5 \times 30\%}{100\%} \end{aligned}$$

$$\text{Vf}_1 = 56,25 \text{ cm}^3$$

$$\begin{aligned} \text{Vf}_2 &= \text{Vf}_1 \times \frac{t_1}{t_2} \\ &= 56,25 \times \frac{0,5}{0,67} \\ &= 41,97 \text{ cm}^3 \end{aligned}$$

b. Massa serat (Mf)

$$\begin{aligned} (\text{Mf}) &= \text{Vf} \times \text{pf} \\ &= 41,97 \text{ cm}^3 \times 1,15 \text{ gr/cm}^3 \\ (\text{Mf}) &= 48,26 \text{ gr} \end{aligned}$$

c. Volume matrik (Vmatrik)

$$\begin{aligned} (\text{Vmatrik}) &= \frac{\text{Vc} \times (100\% - \text{Variasi fraksi volume serat})}{100\%} \\ &= \frac{187,5 \text{ cm}^3 \times (100\% - 30\%)}{100\%} \end{aligned}$$

$$= 131,25 \text{ cm}^3$$

d. Massa matrik (*Vmatrik*)

$$\begin{aligned} M_{\text{matrik}} &= V_{\text{matrik}} \times \rho_{\text{matrik}} \\ &= 131,25 \text{ cm}^3 \times 1.13 \text{ gr/cm}^3 \end{aligned}$$

$$M_{\text{matrik}} = 148,31 \text{ gr}$$

e. Massa resin (*Mresin*)

$$= \frac{100\%}{101\%} \times 126.56 \text{ gr}$$

$$M_{\text{resin}} = 146,84 \text{ gr}$$

f. Massa katalis (*Mkatalis*)

$$\begin{aligned} M_{\text{katalis}} &= M_{\text{resin}} \times 1\% \\ &= 146,84 \text{ gr} \times 1\% \\ &= 1,46 \text{ gr} \end{aligned}$$

5. Perhitungan variasi fraksi volume serat 40% dapat dilihat sebagai berikut :

- ❖ Massa jenis serat sabut kelapa (pf) = 1,15 gr/cm³
- ❖ Massa jenis resin (pm) = 1,13 gr/cm³
- ❖ Volume cetakan (*Vc*) = 187,5 cm
- ❖ Massa matrik (*Mmatrik*)

$$\begin{aligned} M_{\text{matrik}} &= M_{\text{resin}} + M_{\text{katalis}} \\ &= 100\% + 1\% \\ M_{\text{matrik}} &= 101\% \end{aligned}$$

a. Volume serat (*Vf*)

$$V_{f_1} = \frac{V_c \times \text{variasi fraksi volume serat}}{100\%}$$

$$= \frac{187,5 \times 40\%}{100\%}$$

$$V_{f_1} = 75 \text{ cm}^3$$

$$V_{f_2} = V_{f_1} \times \frac{t_1}{t_2}$$

$$= 75 \times \frac{0,5}{0,52}$$

$$= 72,11 \text{ cm}^3$$

b. Massa serat (M_f)

$$\begin{aligned}(M_f) &= V_f \times \rho_f \\ &= 72,11 \text{ cm}^3 \times 1,15 \text{ gr/cm}^3\end{aligned}$$

$$(M_f) = 82,92 \text{ gr}$$

c. Volume matrik (V_{matrik})

$$\begin{aligned}(V_{\text{matrik}}) &= \frac{V_c \times (100\% - \text{Variasi fraksi volume serat})}{100\%} \\ &= \frac{187,5 \text{ cm}^3 \times (100\% - 40\%)}{100\%} \\ &= 112,5 \text{ cm}^3\end{aligned}$$

d. Massa matrik (M_{matrik})

$$\begin{aligned}M_{\text{matrik}} &= V_{\text{matrik}} \times \rho_{\text{matrik}} \\ &= 112,5 \text{ cm}^3 \times 1,13 \text{ gr/cm}^3\end{aligned}$$

$$M_{\text{matrik}} = 127,12 \text{ gr}$$

e. Massa resin (M_{resin})

$$= \frac{100\%}{101\%} \times 127,12 \text{ gr}$$

$$M_{\text{resin}} = 125,86 \text{ gr}$$

f. Massa katalis (M_{katalis})

$$\begin{aligned}M_{\text{katalis}} &= M_{\text{resin}} \times 1\% \\ &= 125,86 \text{ gr} \times 1\% \\ &= 1,25 \text{ gr}\end{aligned}$$