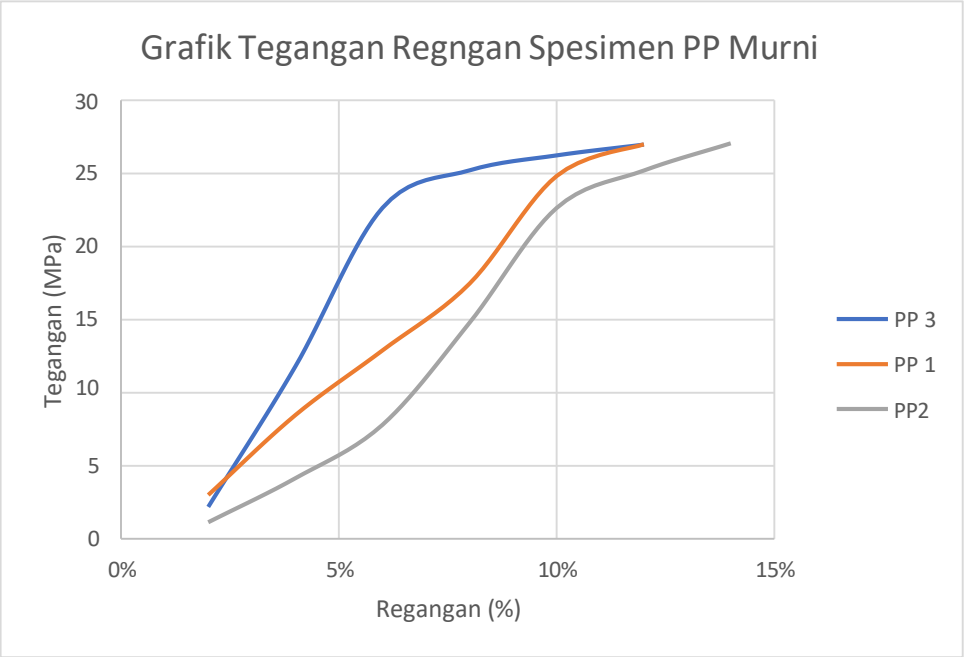
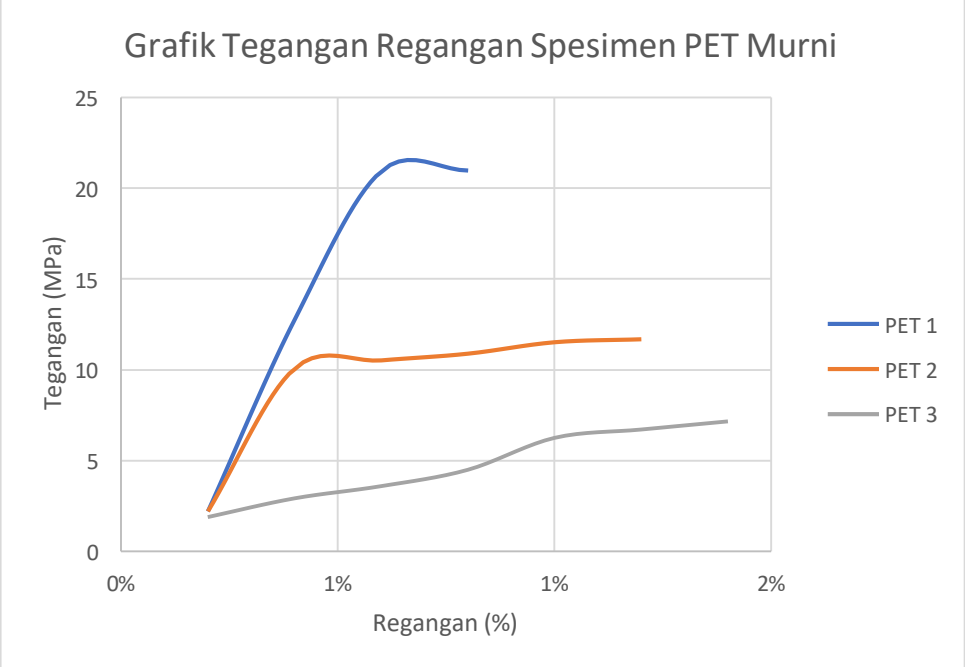
# LAMPIRAN

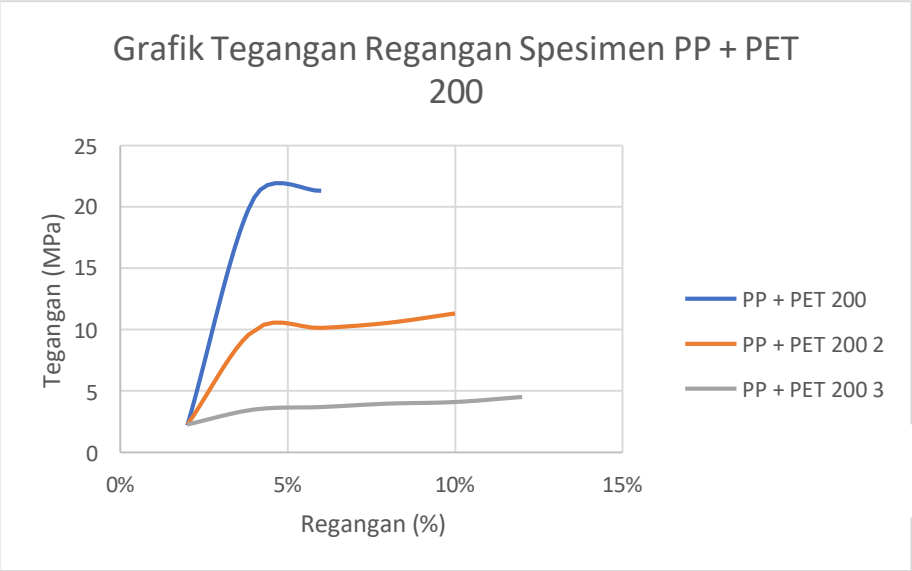
**A. Gambar Grafik Tegangan Regangan Pengujian Tarik Plastik Polypropylen (PP)**



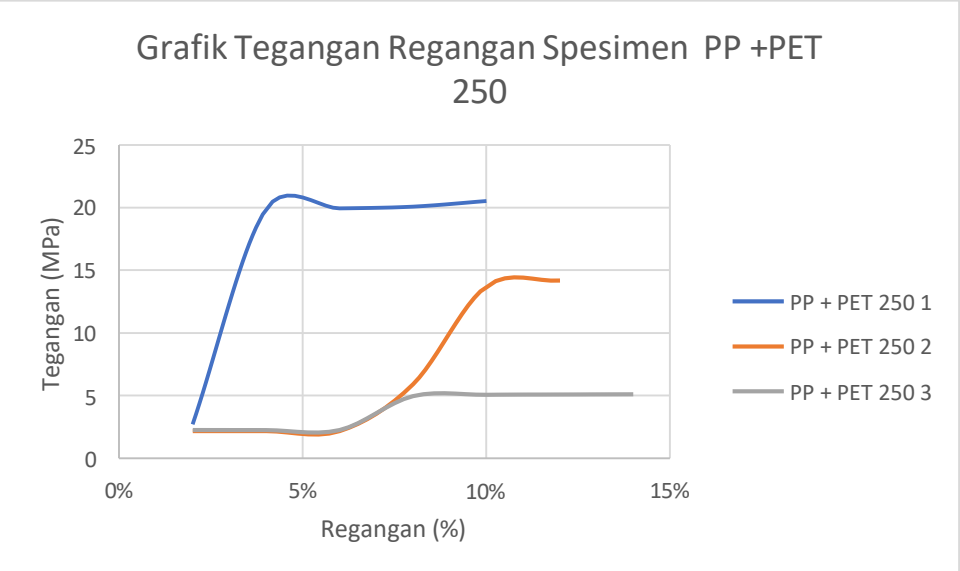

**B. Gambar Grafik Tegangan Regangan Pengujian Tarik Plastik (PET)**



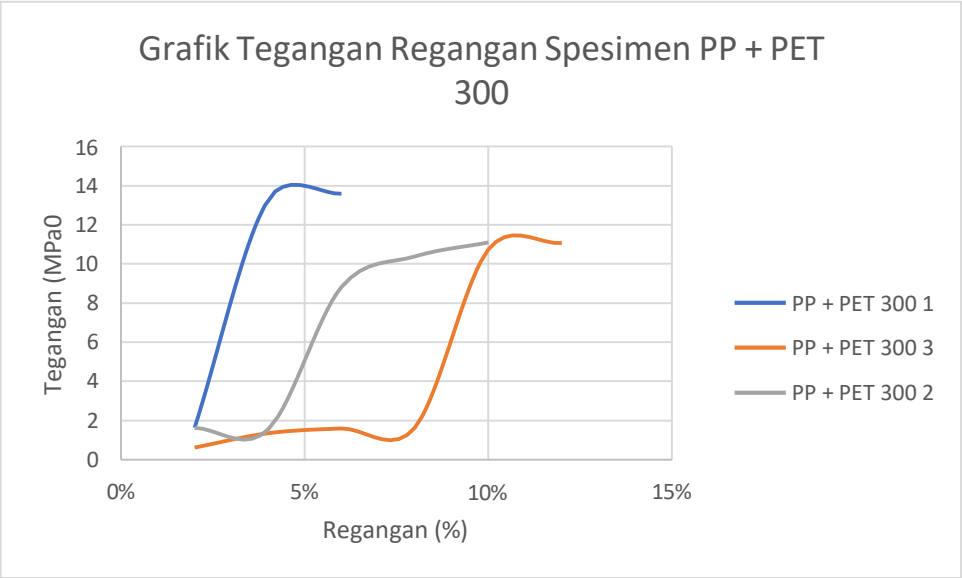
**C. Gambar Grafik Tegangan Regangan Pengujian Tarik Plastik Polypropylen (PP)**




**D. Gambar Grafik Tegangan Regangan Pengujian Tarik Plastik Polypropylen (PP)**



## E. Gambar Grafik Tegangan Regangan Pengujian Tarik Plastik Polypropylen (PP)




## F. PERHITUNGAN

1. Perhitungan Spesimen Uji Tarik Plastik *Polypropylen* (PP) Murni

- Menghitung Luas Penampang

  A = Luas penampang spesimen

  A = Tebal × Lebar

  A = 3 × 10

  A = 30 $mm^2$ = 30 × $10^{-6}$ $m^2$

- Menghitung Tegangan Tarik

  ➢ Spesimen 1

$$\sigma = \frac{beban\ (N)}{A\ (m^2)}$$

$$\sigma = \frac{432.7\ (N)}{30\ x\ 10^{-6}(m^2)}$$

$$\sigma = 14786666.66\ Pa = 14.42\ MPa$$

  ➢ Spesimen 2

$$\sigma = \frac{beban\ (N)}{A\ (m^2)}$$

$$\sigma = \frac{443.6\ (N)}{30\ x\ 10^{-6}(m^2)}$$

$$\sigma = `14786666.6\ Pa = 14.79\ MPa$$

- Spesimen 3

$$\sigma = \frac{beban\ (N)}{A\ (m^2)}$$

$$\sigma = \frac{491\ (N)}{30\ x\ 10^{-6}(m^2)}$$

$$\sigma = 16366666.6\ Pa = 16.37\ MPa$$

- Menghitung Regangan
  - Spesimen 1

$$\epsilon = \frac{\Delta L}{L_o}$$

$$\epsilon = \frac{57 - 50}{50}$$

$$\epsilon = 0.14 = 14\%$$

  - Spesimen 2

$$\epsilon = \frac{\Delta L}{L_o}$$

$$\epsilon = \frac{56 - 50}{50}$$

$$\epsilon = 0.12 = 12\%$$

  - Spesimen 3

$$\epsilon = \frac{\Delta L}{L_o}$$

$$\epsilon = \frac{55 - 50}{50}$$

$$\epsilon = 0.10 = 10\%$$

- Menghitung Modulus Elastisitas
  - Spesimen 1

$$E = \frac{\sigma}{\epsilon}$$

$$E = \frac{14.42}{0.14}$$

$$E = 103\ MPa$$

- Spesimen 2

$$E = \frac{\sigma}{\epsilon}$$

$$E = \frac{14.79}{0.12}$$

$$E = 123.25\ MPa$$

- Spesimen 3

$$E = \frac{\sigma}{\epsilon}$$

$$E = \frac{16.37}{0.10}$$

$$E = 129.97\ MPa$$

2. Perhitungan Spesimen Uji Tarik Plastik *Polyetylen* (PET) Murni

- Menghitung Luas Penampang

A = Luas penampang spesimen

A = Tebal × Lebar

A = 3 × 10

A = 30 $mm^2$ = 30 × $10^{-6}$ $m^2$

- Menghitung Tegangan Tarik

- Spesimen 1

$$\sigma = \frac{beban\ (N)}{A\ (m^2)}$$

$$\sigma = \frac{629.6\ (N)}{30\ x\ 10^{-6}(m^2)}$$

$$\sigma = 20986666.6Pa = 20.99\ MPa$$

- Spesimen 2

$$\sigma = \frac{beban\ (N)}{A\ (m^2)}$$

$$\sigma = \frac{350.5\ (N)}{30\ x\ 10^{-6}(m^2)}$$

$$\sigma = 11683333.3\ Pa = 11.68\ MPa$$

- Spesimen 3

$$\sigma = \frac{beban\ (N)}{A\ (m^2)}$$

$$\sigma = \frac{214.7\ (N)}{30\ x\ 10^{-6}(m^2)}$$

$$\sigma = 7156666.6\ Pa = 7.16\ MPa$$

- Menghitung Regangan
  - Spesimen 1

$$\epsilon = \frac{\Delta L}{L_o}$$

$$\epsilon = \frac{54 - 50}{50}$$

$$\epsilon = 0.08 = 8\%$$

  - Spesimen 2

$$\epsilon = \frac{\Delta L}{L_o}$$

$$\epsilon = \frac{56 - 50}{50}$$

$$\epsilon = 0.12 = 12\%$$

  - Spesimen 3

$$\epsilon = \frac{\Delta L}{L_o}$$

$$\epsilon = \frac{57 - 50}{50}$$

$$\epsilon = 0.14 = 14\%$$

- Menghitung Modulus Elastisitas
  - Spesimen 1

$$E = \frac{\sigma}{\epsilon}$$

$$E = \frac{20.99}{0.08}$$

$$E = 95.63\ MPa$$

  - Spesimen 2

$$E = \frac{\sigma}{\epsilon}$$

$$E = \frac{11.68}{0.12}$$

$$E = 97.33\ MPa$$

- Spesimen 3

$$E = \frac{\sigma}{\epsilon}$$

$$E = \frac{7.16}{0.14}$$

$$E = 51.14\ MPa$$

3. Pehitungan Plastik Polypropylen (PP) dan Polyetylen (PET) suhu 200°C
   - Menghitung Luas Penampang

A = Luas penampang spesimen

A = Tebal × Lebar

A = 3 × 10

A = 30 $mm^2$ = 30 × $10^{-6}$ $m^2$

- Menghitung Tegangan Tarik
  - Spesimen 1

$$\sigma = \frac{beban\ (N)}{A\ (m^2)}$$

$$\sigma = \frac{340.6\ (N)}{30\ x\ 10^{-6}(m^2)}$$

$$\sigma = 11353333.3\ Pa = 11.35\ MPa$$

  - Spesimen 2

$$\sigma = \frac{beban\ (N)}{A\ (m^2)}$$

$$\sigma = \frac{639.9\ (N)}{30\ x\ 10^{-6}(m^2)}$$

$$\sigma = 21330000\ Pa = 21.33\ MPa$$

  - Spesimen 3

$$\sigma = \frac{beban\ (N)}{A\ (m^2)}$$

$$\sigma = \frac{136(N)}{30\ x\ 10^{-6}(m^2)}$$

$$\sigma = 4533333{,}3\ Pa = 4.53\ MPa$$

- Menghitung Regangan
  - Spesimen 1

$$\epsilon = \frac{\Delta L}{L_o}$$

$$\epsilon = \frac{53 - 50}{50}$$

$$\epsilon = 0.06 = 6\%$$

  - Spesimen 2

$$\epsilon = \frac{\Delta L}{L_o}$$

$$\epsilon = \frac{55 - 50}{50}$$

$$\epsilon = 0.10 = 10\%$$

  - Spesimen 3

$$\epsilon = \frac{\Delta L}{L_o}$$

$$\epsilon = \frac{56 - 50}{50}$$

$$\epsilon = 0.12 = 12\%$$

- Menghitung Modulus Elastisitas
  - Spesimen 1

$$E = \frac{\sigma}{\epsilon}$$

$$E = \frac{21.33}{0.12}$$

$$E = 177.75\ MPa$$

  - Spesimen 2

$$E = \frac{\sigma}{\epsilon}$$

$$E = \frac{11.35}{0.10}$$

$$E = 113.5\ MPa$$

- Spesimen 3

$$E = \frac{\sigma}{\epsilon}$$

$$E = \frac{4.53}{0.06}$$

$$E = 75.5\ MPa$$

4. Pehitungan Plastik Polypropylen (PP) dan Polyetylen (PET) suhu 250°C

- Menghitung Luas Penampang

A = Luas penampang spesimen

A = Tebal × Lebar

A = 3 × 10

A = 30 $mm^2$ = 30 × $10^{-6}$ $m^2$

- Menghitung Tegangan Tarik
  - Spesimen 1

$$\sigma = \frac{beban\ (N)}{A\ (m^2)}$$

$$\sigma = \frac{616.4\ (N)}{30\ x\ 10^{-6}(m^2)}$$

$$\sigma = 20546666.6\ Pa = 20.55\ MPa$$

  - Spesimen 2

$$\sigma = \frac{beban\ (N)}{A\ (m^2)}$$

$$\sigma = \frac{426.1\ (N)}{30\ x\ 10^{-6}(m^2)}$$

$$\sigma = 14203333.3\ Pa = 14.20\ MPa$$

  - Spesimen 3

$$\sigma = \frac{beban\ (N)}{A\ (m^2)}$$

$$\sigma = \frac{153.5(N)}{30\ x\ 10^{-6}(m^2)}$$

$$\sigma = 5.1166666\ Pa = 5.12\ MPa$$

- Menghitung Regangan
  - Spesimen 1

    $$\epsilon = \frac{\Delta L}{L_o}$$

    $$\epsilon = \frac{55 - 50}{50}$$

    $$\epsilon = 0.10 = 10\%$$
  - Spesimen 2

    $$\epsilon = \frac{\Delta L}{L_o}$$

    $$\epsilon = \frac{56 - 50}{50}$$

    $$\epsilon = 0.12 = 12\%$$
  - Spesimen 3

    $$\epsilon = \frac{\Delta L}{L_o}$$

    $$\epsilon = \frac{57 - 50}{50}$$

    $$\epsilon = 0.14 = 14\%$$
- Menghitung Modulus Elastisitas
  - Spesimen 1

    $$E = \frac{\sigma}{\epsilon}$$

    $$E = \frac{5.12}{0.10}$$

    $$E = 51.2\ MPa$$
  - Spesimen 2

    $$E = \frac{\sigma}{\epsilon}$$

    $$E = \frac{14.20}{0.12}$$

    $$E = 118.33\ MPa$$
  - Spesimen 3

    $$E = \frac{\sigma}{\epsilon}$$

$$E = \frac{20.55}{0.14}$$

$$E = 146.79\ MPa$$

5. Pehirungan Plastik Polypropylen (PP) dan Polyetylen (PET) suhu 300℃

- Menghitung Luas Penampang

  A = Luas penampang spesimen

  A = Tebal × Lebar

  A = 3 × 10

  A = 30 $mm^2$ = 30 × $10^{-6}$ $m^2$

- Menghitung Tegangan Tarik

  ➢ Spesimen 1

  $$\sigma = \frac{beban\ (N)}{A\ (m^2)}$$

  $$\sigma = \frac{407.4\ (N)}{30\ x\ 10^{-6}(m^2)}$$

  $$\sigma = 13580000\ Pa = 13.58\ MPa$$

  ➢ Spesimen 2

  $$\sigma = \frac{beban\ (N)}{A\ (m^2)}$$

  $$\sigma = \frac{332.7\ (N)}{30\ x\ 10^{-6}(m^2)}$$

  $$\sigma = 11090000Pa = 11.09\ MPa$$

  ➢ Spesimen 3

  $$\sigma = \frac{beban\ (N)}{A\ (m^2)}$$

  $$\sigma = \frac{321.9(N)}{30\ x\ 10^{-6}(m^2)}$$

  $$\sigma = 10730000\ Pa = 10.73\ MPa$$

- Menghitung Regangan

  ➢ Spesimen 1

  $$\epsilon = \frac{\Delta L}{L_o}$$

$$\epsilon = \frac{53 - 50}{50}$$

$$\epsilon = 0.6 = 6\%$$

- Spesimen 2

$$\epsilon = \frac{\Delta L}{L_o}$$

$$\epsilon = \frac{55 - 50}{50}$$

$$\epsilon = 0.10 = 10\%$$

- Spesimen 3

$$\epsilon = \frac{\Delta L}{L_o}$$

$$\epsilon = \frac{56 - 50}{50}$$

$$\epsilon = 0.12 = 12\%$$

- Menghitung Modulus Elastisitas
  - Spesimen 1

$$E = \frac{\sigma}{\epsilon}$$

$$E = \frac{13.58}{0.06}$$

$$E = 205.4\ MPa$$

  - Spesimen 2

$$E = \frac{\sigma}{\epsilon}$$

$$E = \frac{11.09}{0.10}$$

$$E = 118.33 MPa$$

  - Spesimen 3

$$E = \frac{\sigma}{\epsilon}$$

$$E = \frac{11.06}{0.12}$$

$$E = 94.92\ MPa$$

## G. Gambar Pembuatan Produk Palu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