

Stave Measurements

$$L1 := 40\text{in}$$

$$M\text{si} := 10^6\text{psi} \quad E := 55M\text{si} \quad \nu := .017 \quad c1 := 4.85\text{mm} \quad t := .027\text{in}$$

$$h1 := c1 + 2 \cdot t \quad h1 = 6.222 \cdot \text{mm} \quad b := 7.17\text{cm} \quad \text{width} \quad h1 = 0.245 \cdot \text{in}$$

Core and sandwich properties used in four point bend tests

$$D := \frac{E \cdot t \cdot (h1 + c1)^2}{8 \cdot (1 - \nu^2)} \quad D = 3.986 \times 10^3 \cdot \text{Pa} \cdot \text{m}^3 \quad D = 3.528 \times 10^4 \cdot \text{lb} \cdot \text{in}$$

$$G_c := 1.28 \cdot 10^8 \text{Pa} \quad G_c = 1.856 \times 10^4 \cdot \text{psi}$$

$$B := G_c \cdot \left[h1 \cdot \frac{(h1 + c1)}{2 \cdot c1} \right] \quad B = 9.09 \times 10^5 \cdot \text{Pa} \cdot \text{m} \quad B = 5.19 \times 10^3 \cdot \frac{\text{lb} \cdot \text{in}}{\text{in}}$$

Deflection based on central .96 lb load

$$P := 0.96\text{lb} \quad L1 = 1.016\text{m} \quad P = 4.27\text{N} \quad b = 2.823\text{in}$$

$$\delta 1 := \frac{P \cdot L1^3}{48 \cdot b \cdot D} + \frac{P \cdot L1}{4 \cdot B \cdot b} \quad \delta 1 = 0.014\text{in}$$

The calculated deflection is 0.014inches and the measured was 0.0123inches

$$\frac{.014 - .0123}{.014} \cdot 100 = 12.143 \quad \text{predicted value is 12\% high}$$