Solutions

2.1

- $\sigma_a(10^5) = 800 \times 10^{-0.6} = 201.0$ MPa.
- $\sigma_a(10^7) = 800 \times 10^{-0.84} = 115.6$ MPa.

2.2

- $\sigma_a = 200(1 - 120/400) = 140.0$ MPa.

2.3

- $0.08 \times 20 = 1.6$ mm.

2.4

- Titanium: $\sqrt{110}/4.5 = 2.33$ vs steel 1.80 - 29% better per unit mass in bending stiffness.
- It ranks stiffness-per-mass only: cost, corrosion and the impact budget are constraints decided separately.

2.5

- False: fatigue crack growth occurs at amplitudes far below yield - that is its defining danger.

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