The Polymeric Solid State

Blow-molded HDPE milk bottle (recyclable)

Semicrystalline microstructure

Long-chain molecule

Covalently-bonded hydrocarbon
Design for Environment

Beam of Minimum Energy Content

Maximum load:

\[ \sigma = \frac{My}{I} \Rightarrow P_f = \frac{2bd^2}{3L} \cdot \sigma_f \]

For height \( d \) free:

\[ d = \sqrt{\frac{3LP_f}{2b\sigma_f}} \]

Energy content:

\[ m = MH_p = bd L \cdot \rho H_p \]

\[ = \sqrt{\frac{3bL^2}{2}} \cdot \sqrt{\frac{P_f}{\sigma_f}} \cdot \frac{\rho H_p}{\sqrt{\sigma_f}} \]