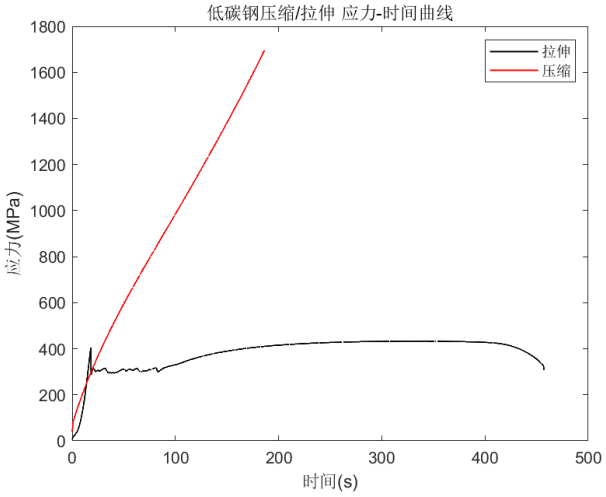
塑性材料(以低碳钢为例)



拉伸

比例极限$\sigma_P = \frac{F_P}{A} = \frac{21321.7N}{7.83828\times10^{-5}m^2} =$ 272.020MPa

屈服点$\sigma_S = \frac{F_S}{A} = \frac{22578.5N}{7.83828\times10^{-5}m^2} = 288.054MPa$

抗拉强度$\sigma_b = \frac{F_b}{A} = \frac{33957.8N}{7.83828\times10^{-5}m^2} = 433.230MPa$

断后伸长率$\delta = \frac{L_1-L}{L}\times100\% = \frac{131.73-100.00}{100.00}\times$

$100\% = 31.73\%$

断面收缩率$\Psi = \frac{A-A_1}{A}\times100\% = \frac{\pi\times(\frac{9.99}{2})^2-\pi\times(\frac{6.18}{2})^2}{\pi\times(\frac{9.99}{2})^2}\times$

$100\% = 61.73\%$

断裂前有很大塑性变形

压缩

屈服极限$\sigma_s = \frac{F_s}{A_g} = \frac{15245.6}{\pi\times\left(\frac{15.00}{2}\times10^{-3}\right)^2} = 86.27MPa$

理论上讲，抗压能力与抗拉能力相近

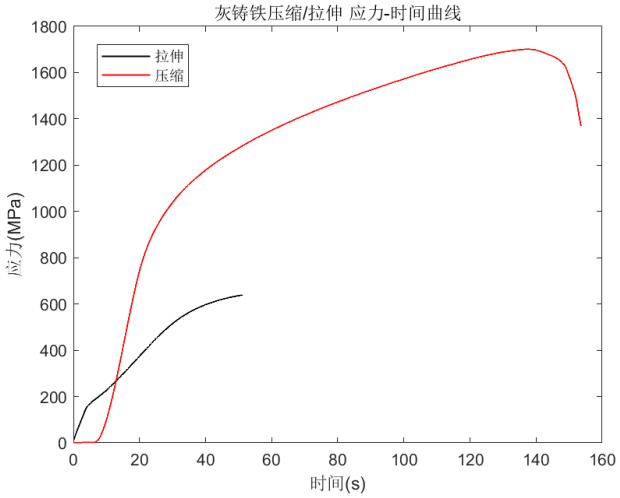
使用范围

受拉杆件

受冲击部位

(要使塑性材料破坏需消耗较大的能量，可用于承受冲击)

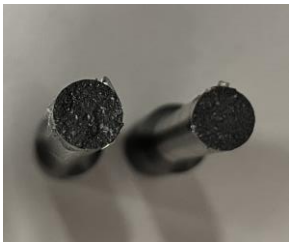
脆性材料(以灰铸铁为例)



拉伸

强度极限$\sigma_{bt} = \frac{F_{bt}}{A} =$ $638.096MPa$

铸铁在拉伸时断口平齐，断口处横截面积几乎没有变化，断裂前变形很小



压缩

压缩强极限$\sigma_b = \frac{F_b}{A_t} = \frac{299799}{\pi\times(\frac{14.98}{2}\times10^{-3})^2} = 1701.05MPa$

抗压能力远大于抗拉能力

压缩强极限约是拉伸强度极限的 2.67 倍

使用范围

受压杆件