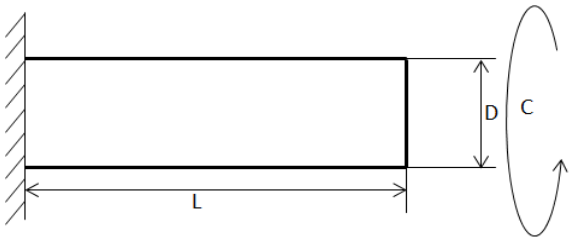
SHAFTS MATERIAL CHOICE

Model and equations

- m : shaft mass
- α : torsion angle
- ρ : density
- G : shear modulus
- I_G : moment of inertia

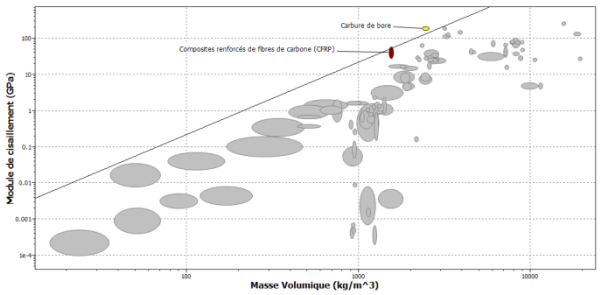


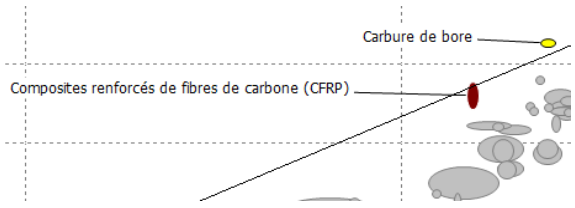
$$m = \sqrt{2\pi L^{3/2}} \sqrt{\frac{C}{\alpha}} \frac{\rho}{\sqrt{G}}$$

Geometry — Torque — **Material**

Performance index

$$I_1 = \frac{G}{\rho^2}$$

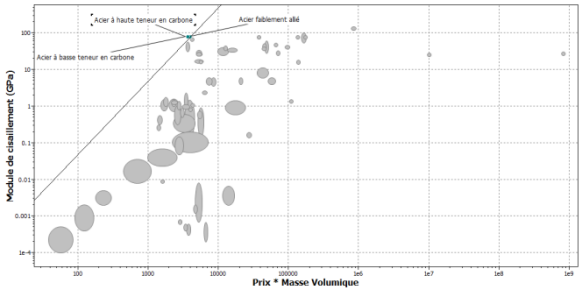


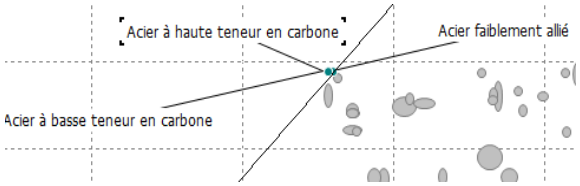


→ Carbon fiber composite

$$I_2 = \frac{G}{(\rho c)^2}$$

c : mass cost





→ High carbon steel

25CrMo4 steel shafts