

Drag & Lift

Mechanical Engineering

Typical drag coefficients, and why power rises with the cube of speed.

Drag force = $\frac{1}{2}\rho V^2 A C_d$. Values are for the turbulent regime, frontal area.

Body	Drag coefficient	Note
Flat plate, face on	about 1.2	Almost all pressure drag
Smooth sphere	about 0.47	Drops near $Re\ 3\times 10^5$
Cylinder, cross flow	about 1.2	Sheds vortices
Modern car	0.25 to 0.35	Frontal area
Streamlined aerofoil	about 0.04	At a low angle

Drag goes as velocity squared, so the power to overcome it goes as velocity cubed. Speed is expensive.