Vehicle Road Load Requirement

$$P_b = \frac{1}{\eta_T}(F_R + F_D + F_a + F_C)\,S_V$$

P_b = Required engine brake power output

η_T = Transmission efficiency

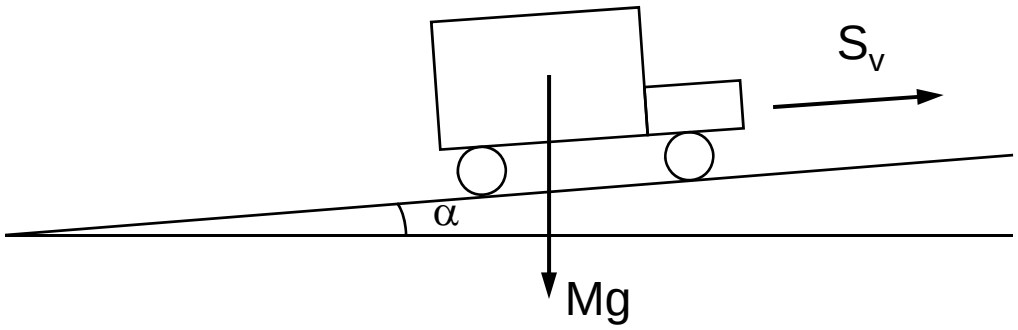
F_R = Rolling frictional force (= C_R Mg cos(α) ; C_R ~ 0.015)

F_D = Aerodynamic drag force (= 0.5 ρ_a S_v^2 C_D A_v ; C_D ~ 0.3)

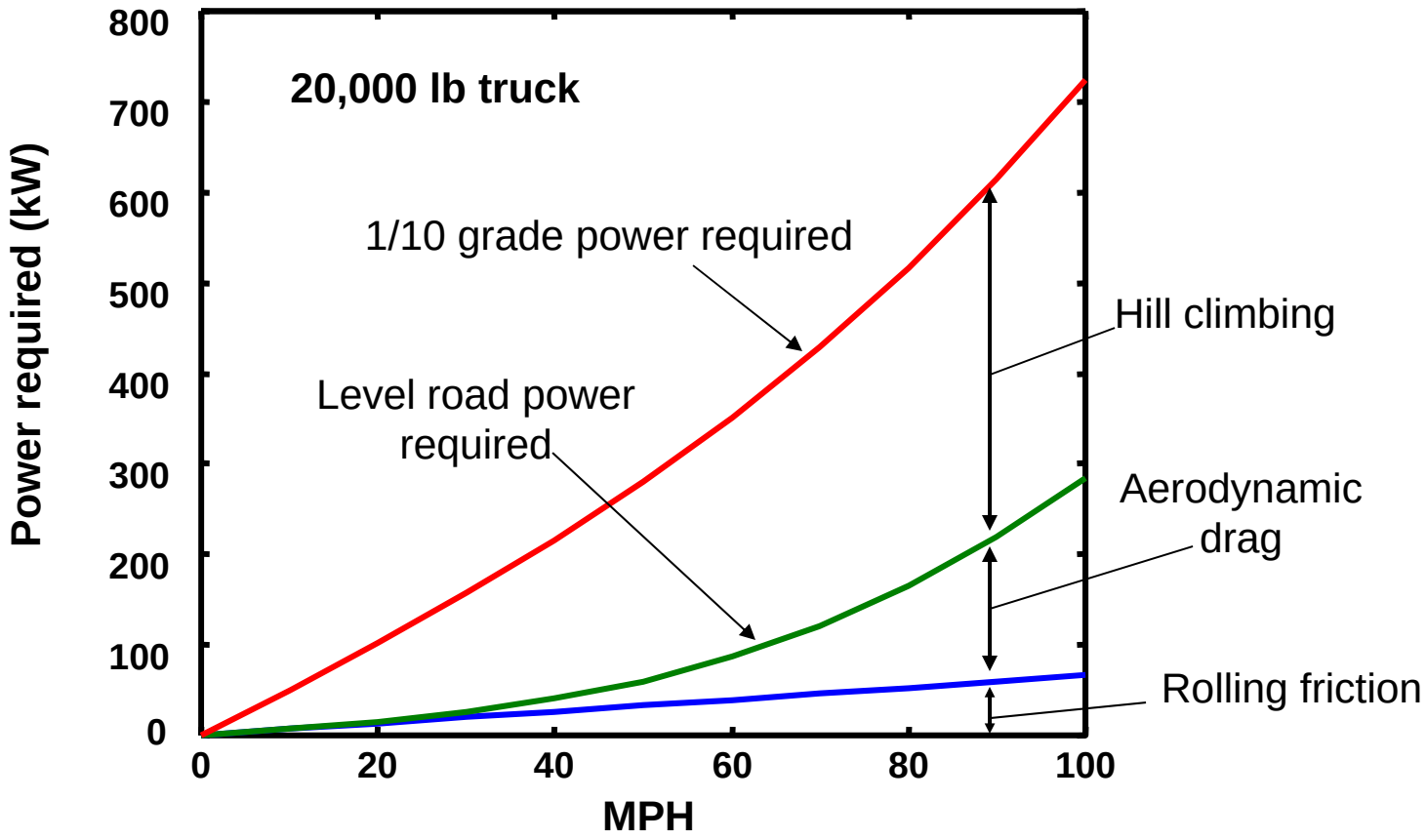
F_a = Force to provide acceleration (= Ma)

F_C = Force for climbing incline = (Mg sin(α)) ; negative for downhill

S_v = Vehicle speed



Truck Road Load Requirement



Vehicle Road Load Requirement

Vehicle speed and engine rpm are related

$$S_v = \frac{N \pi d}{G.R.}$$

Sv = Vehicle speed

N = Engine revolution per second (= RPM / 60)

G.R. = Overall gear ratio

d = External diameter of tire

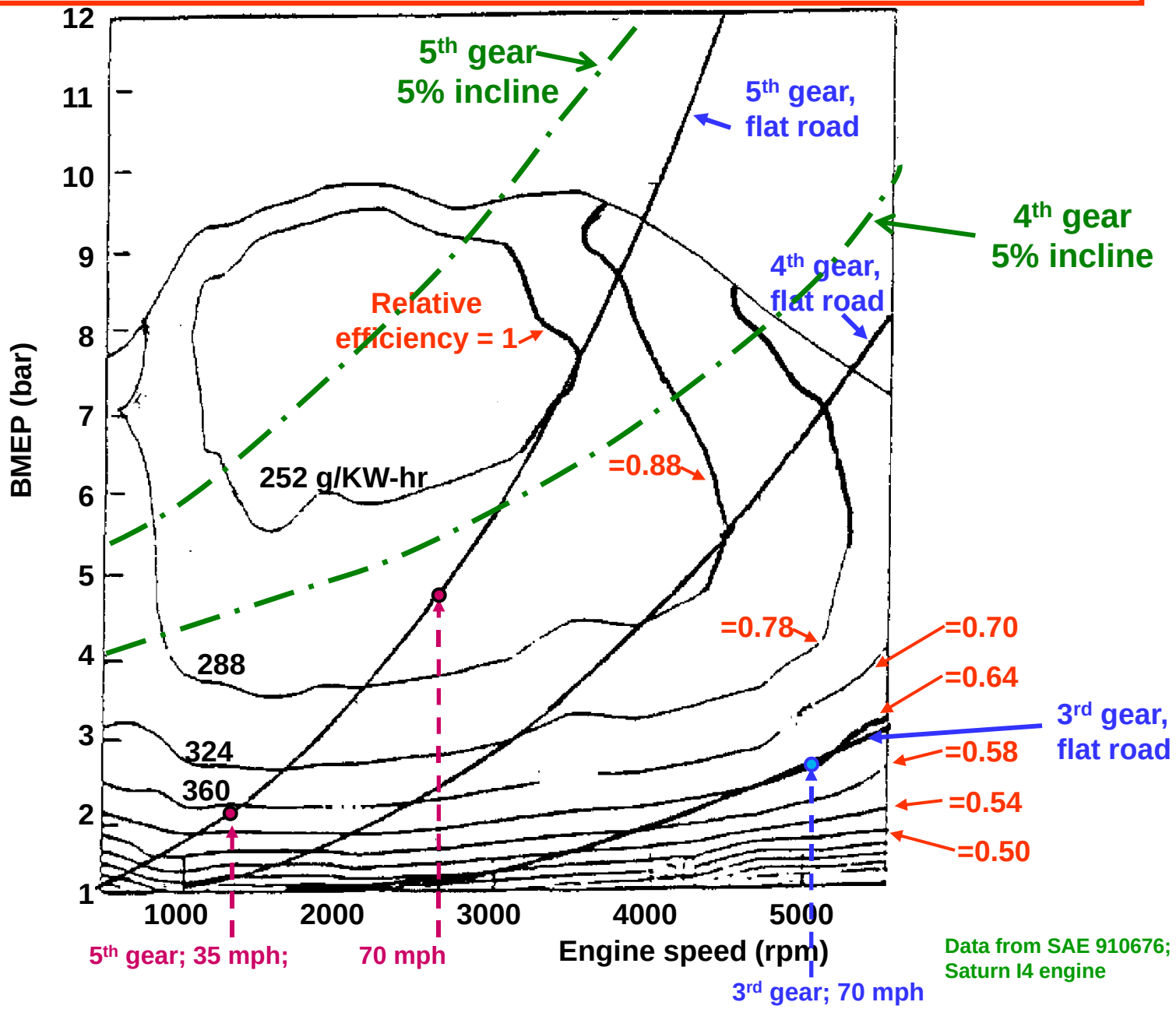
BMEP of engine

$$BMEP = \frac{P_b}{V_D N / n_R}$$

V_D = Engine displacement

η_R = 1 for two-stroke engine; 2 for four-stroke engine

Passenger car SI engine map



2.61 Internal Combustion Engines
Spring 2017