

Sports car design project, engineering specification notes

Notes, for the suspension design team:

While the design of the sports car is not finalised yet, we were able to estimate the vehicle's weight, and apportion this to relevant suspension components. These are proportionally allocated to a quarter car model as follows:

Driver's seat and fixings (including driver) $M_3 = 100 \text{ kg}$

Vehicle chassis $M_2 = 250 \text{ kg}$

Wheels, axles etc. $M_1 = 50 \text{ kg}$

(final weights may differ slightly, subject to materials and components selection).

The damping and stiffness coefficients of the so far selected components are as follows. The car will have the capability to switch between two main suspension settings, one for 'cruise mode' and one for a 'sports mode'. Each mode yields a different set of damping/stiffness coefficients for the suspension.

Driver's seat fixings, stiffness	$K_1 = 2200 \text{ N/m}$	
Driver's seat fixings, damping	$C_1 = 700 \text{ Ns/m}$	
Driver's seat back friction	$C_3 = 300 \text{ Ns/m}$	
Suspension spring	$K_2 = 8000 \text{ N/m} \text{ (Cruise mode)}$	$K_2 = 13000 \text{ N/m} \text{ (Sports mode)}$
Suspension damper	$C_2 = 900 \text{ Ns/m} \text{ (Cruise mode)}$	$C_2 = 1500 \text{ Ns/m} \text{ (Sports mode)}$
Wheel-Tyre	$K_3 = 120000 \text{ N/m}$	