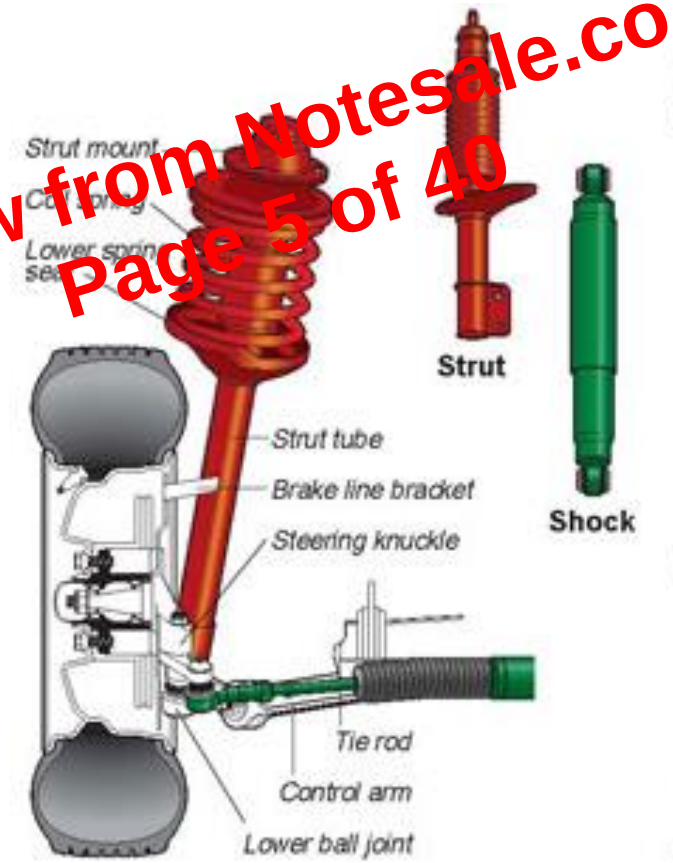
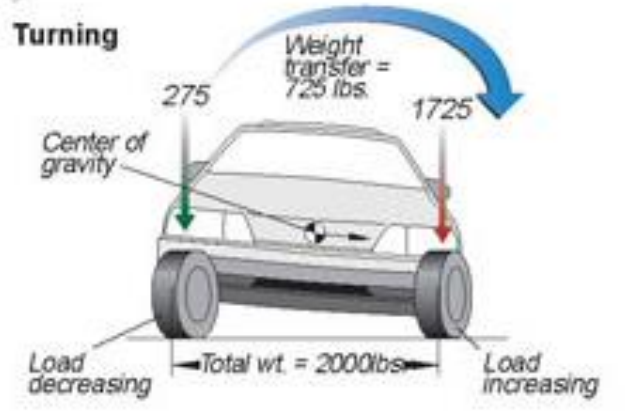
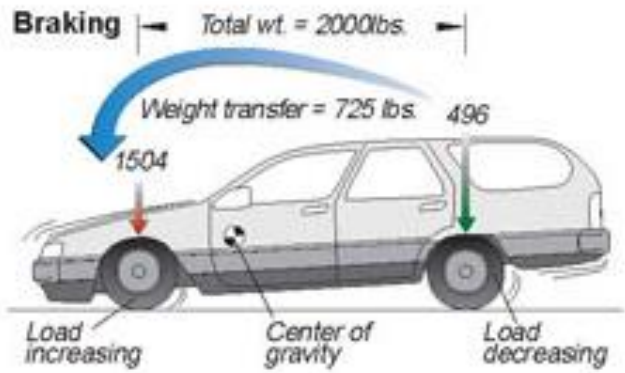
ACTIVE SUSPENSION SYSTEMS







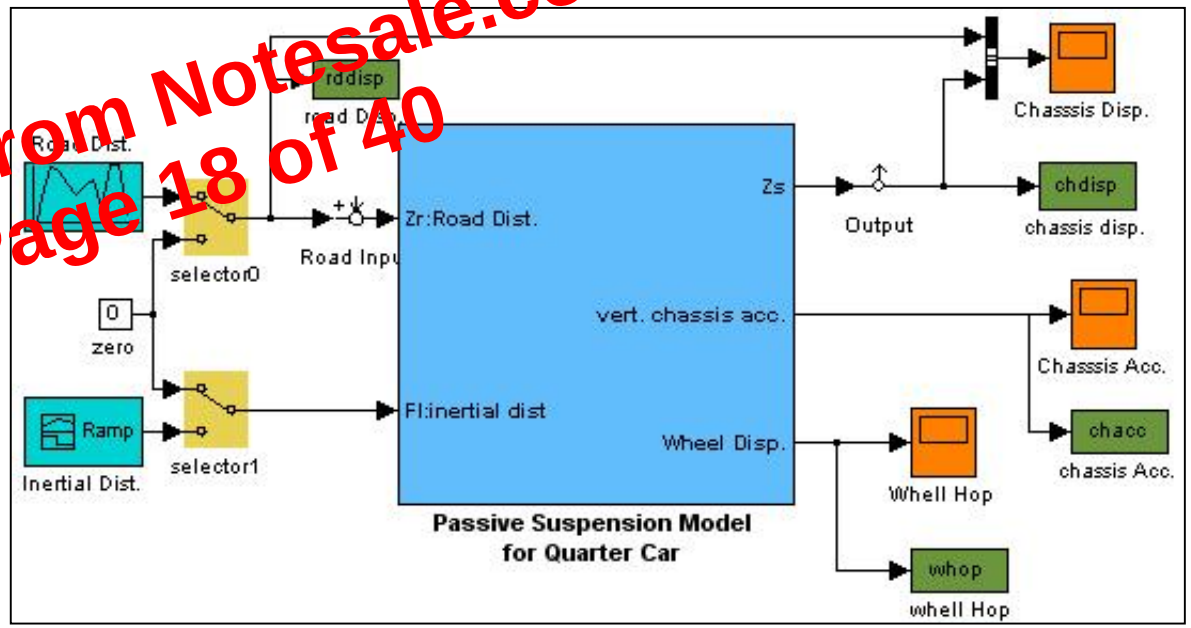
Vehicle motion (Roll and Pitch)

Passive Suspension Model

$$m_s\ddot{z}_s + b_p(\dot{z}_s - \dot{z}_u) + k_p(z_s - z_u) = 0$$

$$m_u\ddot{z}_u + k_t(z_u - z_r) - b_p(\dot{z}_s - \dot{z}_u) - k_p(z_s - z_u) = 0$$

Passive Suspension Model



Sprung mass	(m_s)	250 kg
Unsprung mass	(m_u)	36 kg
Tire stiffness	(k_t)	160 000 N/m
Spring stiffness	(k_p)	16 000 N/m
Damping rate	(b_p)	1750 Ns/m

Active Suspension Systems

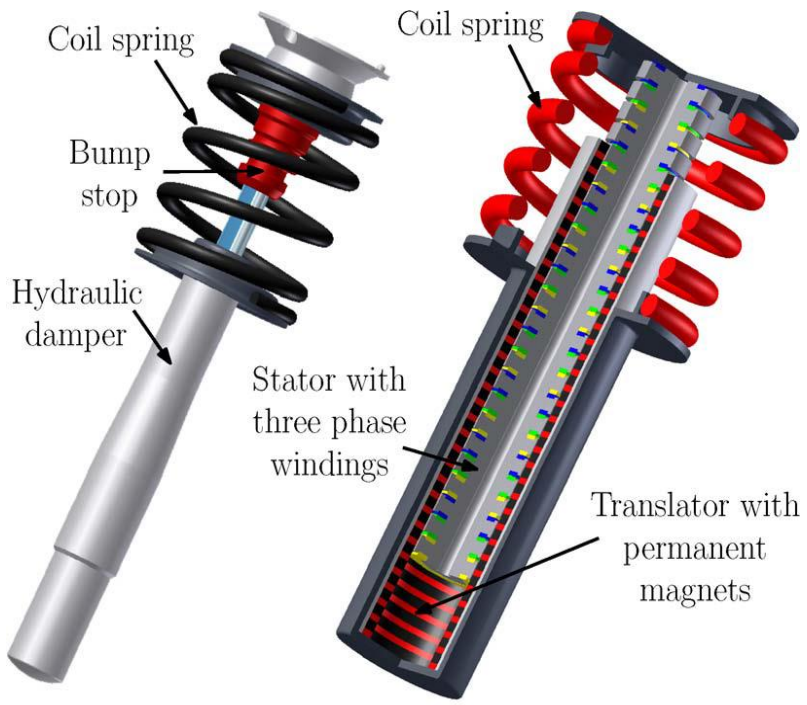
Electromagnetic Systems

<u>Advantages:</u>

1) increased efficiency
2) improved dynamic behavior
3) stability improvement
4) accurate force control
5) dual operation of the actuator

<u>Disadvantages:</u>

1) increased volume of the suspension, since the force density of the active part of hydraulics is higher than for electromagnetic actuation, i.e., system mass and volume could be less
2) relatively high current for a 12- to 14-V system
3) conventional designs that need excitation to provide a continuous force
4) higher system costs



Active Suspension Model