SUSPENSION SYSTEM

Shivam Bansal
Mechanical Department
Dronacharya College of Engineering
Khentawas, Farukhnagar,Gurgaon
Email-shivamb990@gmail.com

Yogesh Vashiath
Mechanical Department
Dronacharya College of Engineering
Khentawas, Farukhnagar,Gurgaon
Email-yogeshvashiath.vash40@gmail.com

Ujjwal Batra
Mechanical Department
Dronacharya College of Engineering
Khentawas, Farukhnagar,Gurgaon
Email-ujjwal28@gmail.com

INTRODUCTION

Suspension is the system of tires, tire air, springs, shock absorbers and linkages that connects a vehicle to its wheels and allows relative motion between the two.[1] Suspension systems serve a dual purpose — contributing to the vehicle's roadholding/handling and braking for good active safety and driving pleasure, and keeping vehicle occupants comfortable and a ride quality reasonably well isolated from road noise, bumps, and vibrations,etc.[2] These goals are generally at odds, so the tuning of suspensions involves finding the right compromise. It is important for the suspension to keep the road wheel in contact with the road surface as much as possible, because all the road or ground forces acting on the vehicle do so through the contact patches of the tires. The suspension also protects the vehicle itself and any cargo or luggage from damage and wear. The design of front and rear suspension of a car may be different.

he purpose of the complete suspension system is to isolate the vehicle body from road shocks and vibrations which would otherwise be transferred to the passengers and load.

It must also keep the tires in contact with the road, regardless of road surface.

A basic suspension system consists of springs, axles, shock absorbers, arms, rods, and ball joints.

The spring is the flexible component of the suspension. Basic types are leaf springs, coil springs, and torsion bars.

Modern passenger vehicles usually use light coil springs.

Light commercial vehicles have heavier springs than passenger vehicles, and can have coil springs at the front and leaf springs at the rear.

Heavy commercial vehicles usually use leaf springs, or air suspension.

Solid, or beam, axles connect the wheels on each side of the vehicle. This means the movement of a wheel on one side of the vehicle is transferred to the wheel on the other side.

With independent suspension, the wheels can move independently of each other, which reduces body movement. This prevents the other wheel being affected by movement of the wheel on the opposite side, and this reduces body movement.

When a wheel strikes a bump, there is a reaction force, and energy is transferred to the spring which makes it oscillate. Oscillations left uncontrolled can cause loss of traction between the wheel and the road surface.

Shock absorbers dampen spring oscillations by forcing oil through small holes. The oil heats up, as it absorbs the energy of the motion. This heat is then transferred through the body of the shock absorber to the air.

When a vehicle hits an obstruction, the size of the reaction force depends on how much unsprung mass is at each wheel assembly.

Sprung mass refers to those parts of the vehicle supported on the springs. This includes the body, the frame, the engine, and associated parts.

Unsprung mass includes the wheels, tires, brake assemblies, and suspension parts not supported by the springs.

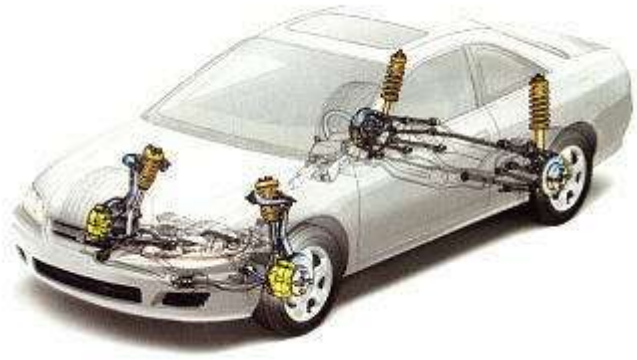
Vehicle ride and handling is improved by keeping unsprung mass as low as possible. Wheel and brake units that are small and light follow the road contours without a large effect on the rest of the vehicle.

HOW CAR SUSPENSIONS WORK

When people think of automobile performance, they normally think of horsepower, torque and zero-to-60 acceleration. But all of the power generated by a piston engine is useless if the driver can't control the car. That's why automobile engineers turned their attention to the suspension system almost as soon as they had mastered the four-stroke internal combustion engine.

The job of a car suspension is to maximize the friction between the tires and the road surface, to provide steering stability with good handling and to ensure the comfort of the passengers. In this article, we'll explore how car suspensions work, how they've evolved over the years and where the design of suspensions is headed in the future.

Photo courtesy Honda Motor Co., Ltd



if a road were perfectly flat, with no irregularities, suspensions wouldn't be necessary. But roads are far from flat. Even freshly paved highways have subtle imperfections that can interact with the wheels of a car. It's these imperfections that apply forces to the wheels. According to Newton's laws of motion, all forces have bothmagnitude and direction. A bump in the road causes the wheel to move up and down perpendicular to the road surface. The magnitude, of course, depends on whether the wheel is striking a giant bump or a tiny speck. Either way, the car wheel experiences a vertical acceleration as it passes over an imperfection.

Without an intervening structure, all of wheel's vertical energy is transferred to the frame, which moves in the same direction. In such a situation, the wheels can lose contact with the road completely. Then, under the downward force of gravity, the wheels can slam back into the road surface. What you need is a system that will absorb the energy of the vertically accelerated wheel, allowing the frame and body to ride undisturbed while the wheels follow bumps in the road.

TYPES OF SUSPENSION

1. Suspension systems

The purpose of the suspension system is to isolate the vehicle body from road bumps and vibrations, while keeping the wheels in contact with the road.

2. Solid axle

The solid, or beam, axle is used in the rear suspension of many front-engined, rear-wheel drive cars, and light commercial vehicles, and as the front suspension on many heavy commercial vehicles.

3. Dead axle

A dead axle only supports the vehicle and doesn't transmit any drive. With a live axle, the drive is transmitted through the final drive unit and axles to the wheels.

4. Independent suspensions

Independent suspension helps keep unsprung mass low. Also, if a wheel hits an irregularity, it won't upset the opposite wheel on the same axle. It allows wheel camber to be adjusted, or designed into the suspension geometry.

5. Rear independent suspension

For independent suspension on the rear of a vehicle, many front-wheel drive cars use a McPherson strut at the rear. On rear-wheel drive vehicles, the suspension has to allow for the external drive shafts.

6. Rear-wheel drive independent suspension

On rear-wheel drive vehicles with independent suspension, the final drive unit is fixed to the vehicle frame. Drive is transmitted to each wheel by external drive shafts.

7. Adaptive air suspension

Adaptive air suspension is an electronically controlled air suspension system at all four wheels with a continuously adaptive damping system.

8. Adaptive air suspension operation

The height sensor uses the induction principle to constantly monitor the distance between the vehicle's axle and its chassis.

REFRENCES

- http://www.cdxetextbook.com/steersusp/susp/types/suspensys.html
- http://en.wikipedia.org/wiki/Suspension_(vehicle)
- http://auto.howstuffworks.com/car-suspension.htm