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DEPARTMENT OF AUTOMOBILE ENGINEERING

COURSE NAME : 19AUB202 – AUTOMOTIVE SYSTEMS

II YEAR / III SEMESTER

Unit 4 – Suspension System

Topic : Shock Absorber



SHOCK ABSORBER



- ❖ Shock absorbers, also known as dampers, play a crucial role in a vehicle's suspension system.
- ❖ Their primary function is to absorb and dissipate the kinetic energy generated by the movement of the vehicle's springs, which occurs as a result of road irregularities, bumps, and other disturbances.



ROLE OF SHOCK ABSORBER



- ❖ One of the main purposes of shock absorbers is to provide a smooth and comfortable ride for passengers.
- ❖ By absorbing and dampening the impact of road irregularities, they reduce the jolts and vibrations transmitted to the vehicle's body and occupants.
- ❖ Shock absorbers help to maintain consistent contact between the tires and the road surface.
- ❖ Shock absorbers contribute to the overall stability and handling of a vehicle
- ❖ Shock absorbers play a role in maintaining proper weight transfer during braking.



TYPES OF SHOCK ABSORBER



❖ Conventional (Hydraulic) Shock Absorbers:

- These are the traditional and most widely used shock absorbers.
- They use hydraulic fluid to dampen and control the movement of the suspension.
- Consist of a piston inside a cylinder filled with hydraulic fluid.
- As the suspension moves, the piston pushes against the fluid, creating resistance.

❖ Gas-Charged Shock Absorbers:

- Similar to hydraulic shock absorbers but filled with nitrogen gas as well.
- The gas helps reduce foaming of the hydraulic fluid, which can occur under heavy use.
- Gas-charged shocks are known for better performance under challenging conditions.



TYPES OF SHOCK ABSORBER



❖ **Twin-Tube Shock Absorbers:**

- Consist of two concentric tubes - an inner tube containing the piston and an outer tube.
- The inner tube is where the hydraulic fluid is located, while the outer tube provides additional protection and heat dissipation.
- Commonly used in a variety of vehicles due to their cost-effectiveness.

❖ **Mono-Tube Shock Absorbers:**

- Feature a single tube with the piston and hydraulic fluid.
- Often used in performance and sports cars due to their ability to dissipate heat more efficiently.
- Provide a larger piston, allowing for better damping performance.



TYPES OF SHOCK ABSORBER



❖ Air Shock Absorbers:

- Use air as a spring medium in addition to traditional shock absorption mechanisms.
- Can be adjusted to change the vehicle's ride height and stiffness.
- Commonly found in luxury vehicles and certain SUVs for enhanced comfort and load-leveling capabilities.

❖ Electronically Adjustable Shock Absorbers:

- Equipped with electronic control systems that allow for real-time adjustment of damping rates.
- Can be manually adjusted by the driver or automatically adjusted based on driving conditions and inputs.
- Provide a balance between comfort and performance.



TYPES OF SHOCK ABSORBER



❖ Coil over Shock Absorbers:

- Combine a shock absorber and a coil spring into a single unit.
- Allow for ride height adjustment and fine-tuning of suspension settings.
- Popular in performance-oriented and racing applications.

❖ Magnetic Ride Control Shock Absorbers:

- Use magnetorheological fluid and electromagnetic fields to adjust damping rates.
- Offer rapid and continuous adjustments, providing a smooth ride and improved handling.
- Commonly found in high-performance and luxury vehicles.



TELESCOPIC SHOCK ABSORBER



- ❖ A telescopic shock absorber is a common type of shock absorber used in many vehicles, particularly in the front suspension.
- ❖ It is a hydraulic device designed to dampen and control the movement of a vehicle's suspension system.
- ❖ Telescopic shock absorbers are widely used because of their simplicity, effectiveness, and ease of installation.



COMPONENTS



- **Cylinder Body:** The outer tube, or cylinder body, is a long cylindrical tube usually mounted to the vehicle's frame or body.
- **Piston Rod:** The inner rod is attached to the piston and extends out of the top of the cylinder. This rod is connected to the vehicle's suspension components.
- **Piston:** Inside the cylinder, there is a piston that moves up and down. The piston is equipped with valves that control the flow of hydraulic fluid.
- **Hydraulic Fluid:** The cylinder is filled with hydraulic fluid. As the suspension moves, the piston pushes against the fluid, creating resistance.
- **Valves:** The piston contains valves that control the flow of hydraulic fluid. These valves regulate the speed at which the shock absorber compresses and rebounds.



WORKING



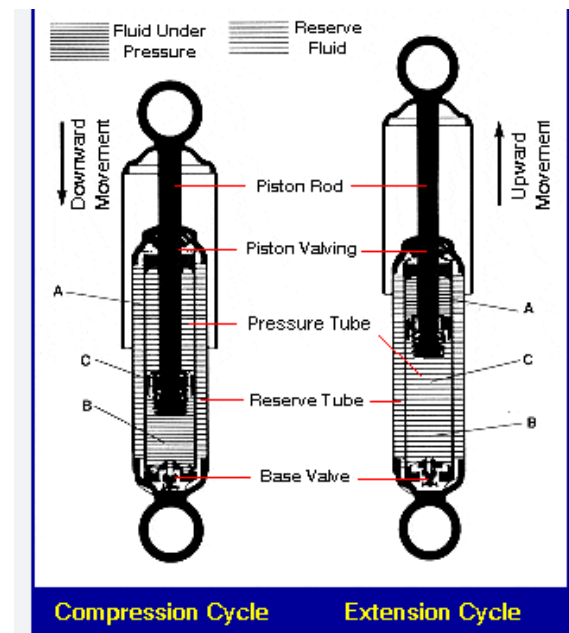
- ❖ When the vehicle encounters a bump or disturbance on the road, the suspension system is compressed.
- ❖ This compression causes the telescopic shock absorber's piston to move down into the cylinder.
- ❖ The hydraulic fluid is forced through the valves, creating resistance and slowing down the compression movement.
- ❖ When the suspension extends, such as when the vehicle goes over a dip or depression in the road, the piston moves upward.
- ❖ Again, the valves control the flow of hydraulic fluid, providing resistance to the extension movement.



WORKING



- ❖ The damping effect created by the telescopic shock absorber helps control the oscillations and vibrations of the suspension system, providing a smoother and more comfortable ride.
- ❖ It also contributes to vehicle stability and handling by preventing excessive bouncing or swaying.





THANK YOU !!!