Two and Three Wheeler Technology

MODULE : 4

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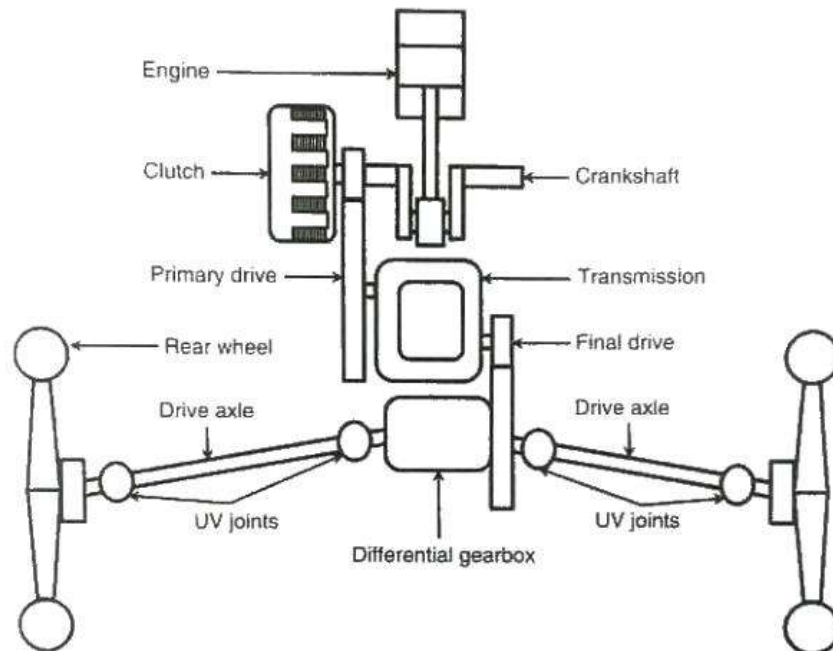
THREE WHEELERS

Three wheelers are classified as

- Passenger auto rickshaw
- Loading auto rickshaw
- Special purpose three wheeler

DRIVE TRAIN OF THREE WHEELERS

➢ Drive Train Layout for Passenger Auto Rickshaws
➢ Drive Train Layout for Loading Auto Rickshaws

## ❖ Drive Train Layout for Passenger Auto Rickshaws

Drive Train Layout of Passenger Auto Rickshaw.

The passenger auto rickshaws use rear located engine with a compact transmission unit to transmit the power and torque to the drive axles. The drive train layout for a passenger auto rickshaw conventionally uses wet multiplate clutch due to space limitations. The clutch is connected with the transmission box through the primary drive. Transmission box is constant-mesh gearbox. A helical gear pair is used as a final drive to provide necessary power and torque transmission.

Three wheelers are double track vehicle at rear, it is required to allow speed difference between inner wheel and outer wheel while moving through turn. A differential is provided to accomplish it and, it helps to achieve correct steering without any skidding. Two drive axles connect the driving wheels with the differential gearbox which allow for suspension movements. They are provided either with constant- velocity joints or with two universal joints, **CV joint facilitates drive axles to change its length without changing power transmission.**

❖ Drive Train Layout for Loading Auto Rickshaws

Drive train layout of Loading auto rickshaw
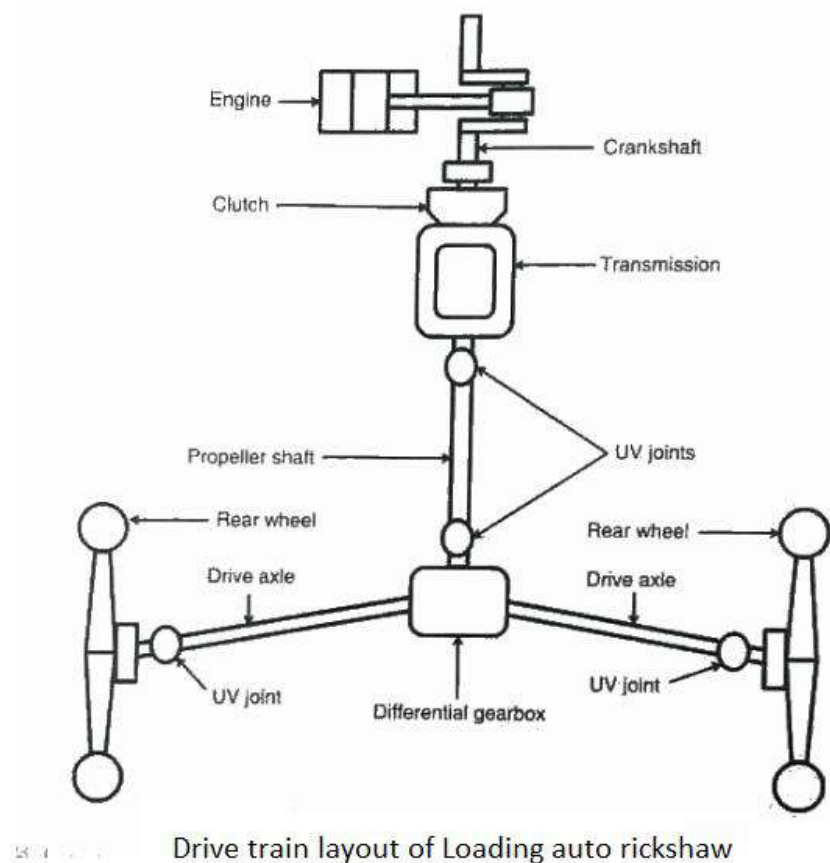
It uses longitudinal crankshaft mounted four-stroke diesel engine. This layout provides sufficient space to accommodate a single plate clutch, which efficiently transmits the engine power and torque to the constant-mesh gearbox. The distance between gearbox and differential is more in this layout, it becomes essential to use a propeller shaft.

The propeller shaft transmits drive from the gearbox output to the final drive in the rear axle. The propeller shaft also allows for suspension movements because of which it is provided with universal joints and slip joints. Sometimes, combination of two flexible coupling and slip joint facilitates propeller shaft to change its length without changing power transmission.

SUSPENSIONS SYSTEM OF THREE WHEELERS

Almost all three wheelers use *leading or trailing link suspension* **at front**, however, the rear suspension varies with type and application of particular vehicle.

- *Passenger auto rickshaws* use **Swing arm type suspension** at rear

- *Loading auto rickshaws* use **Semi-elliptical leaf spring type suspension** at rear

REAR SUSPENSION SYSTEM OF PASSENGER AUTO RICKSHAW

- **Swing Arm Suspension of Passenger Auto Rickshaw**

Swinging Arm suspension of passenger Auto rickshaw
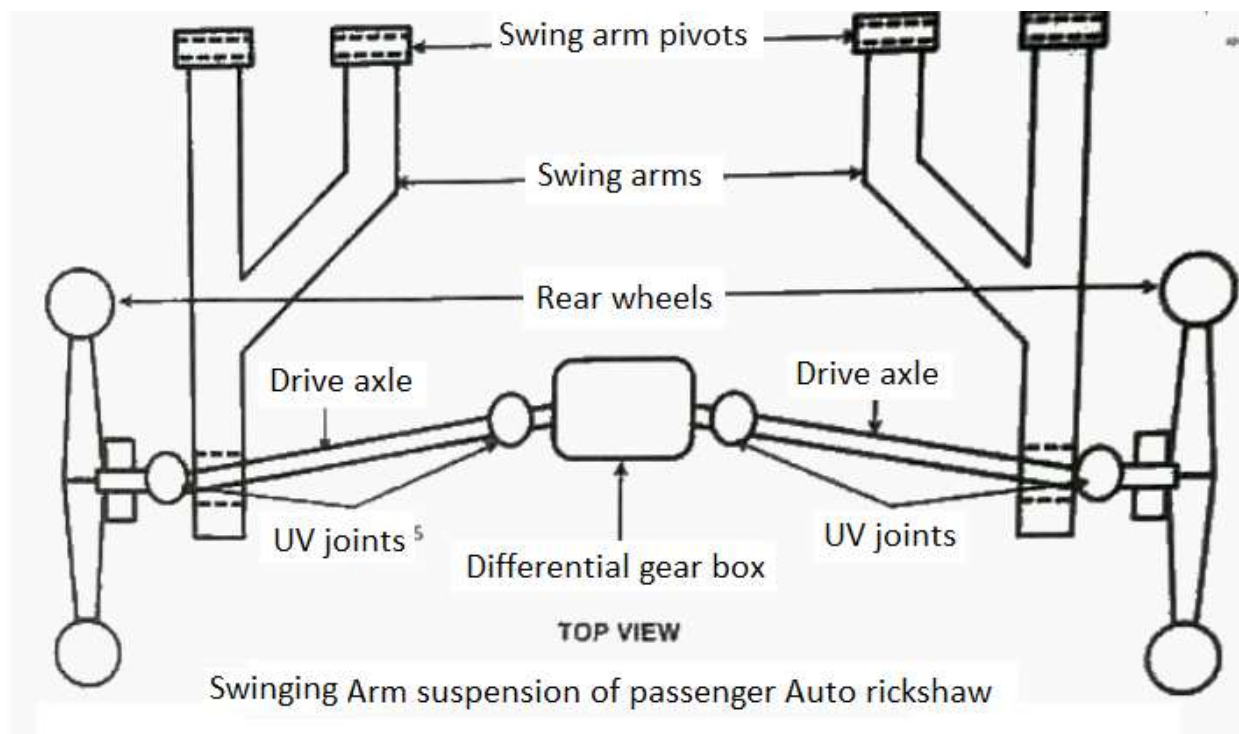
Two pivots points are used to mount the swing arm on the body or on the frame which avoids lateral movement of the swing arm during cornering. The swing arm is either fabricated from box channel or from hollow circular tubing. At various locations, extra steel plate are stamped to strengthen the swing arm structure. A hollow passage on the end is used to assemble the drive shaft with the wheel. The suspension strut is attached between the extreme end and body.

The triangulation formed between rigid body, swing arm and suspension strut provides necessary suspension action when vehicle moves on bumps or potholes.
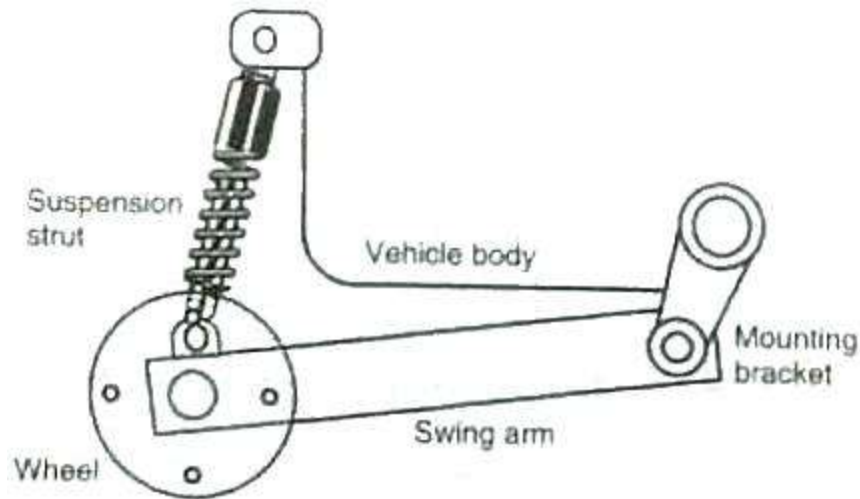

Triangulation in Swing Arm Suspension.

Advantages: Simple construction, less weight and economic cost.

Disadvantages: Frequent overloading of vehicle causes vertical bending in the swing arm structure. It also generates undesirable camber in the rear wheels. This camber causes decreased suspension travel, power loss and uneven tyre wear.

REAR SUSPENSION SYSTEM OF LOADING AUTO RICKSHAW

- ## Semi-elliptical leaf springSus pension of Passenger Auto Rickshaw
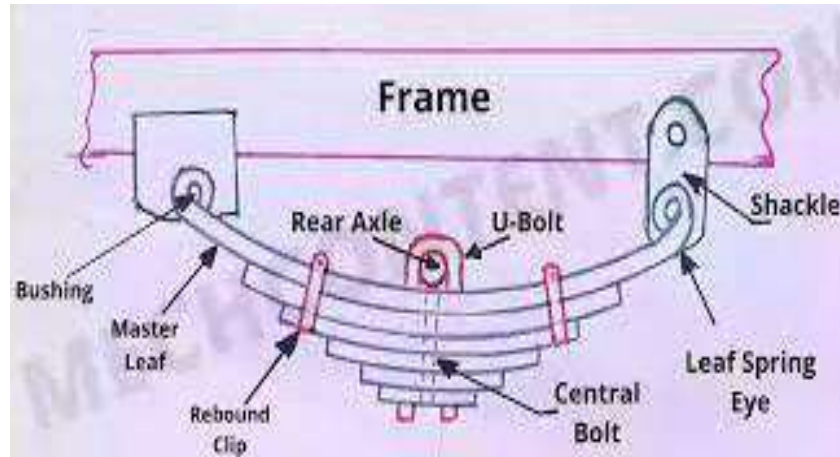
The semi-elliptical leaf spring suspension system is typically used in the rear suspension of a Loading Auto Rickshaw. It works by providing support and cushioning between the vehicle frame and the rear axle, which helps to absorb bumps and vibrations from the road and maintain a smooth ride.

The semi-elliptical leaf spring suspension system consists of several curved steel leaves that are clamped together at the center with a U-bolt. The ends of the leaves are mounted to the vehicle frame and rear axle using shackles.

When the vehicle hits a bump or encounters uneven terrain, the semi-elliptical leaf springs compress and flex, absorbing the shock and distributing the weight of the vehicle evenly across the suspension system. This helps to reduce the impact of the bump on the vehicle and maintain a smooth ride.

Advantages

- Simple and durable construction and they have a long service life.
- Semi-elliptical leaf springs are relatively inexpensive to produce.
- Good load-carrying capacity
- Good stability.

Disadvantages

- Relatively stiff, which can result in a rough and uncomfortable ride
- Not easily adjustable
- Relatively heavy, which can increase the overall weight of the vehicle and reduce fuel efficiency.

HYDRAULIC BRAKE SYSTEM IN 3 WHEELER
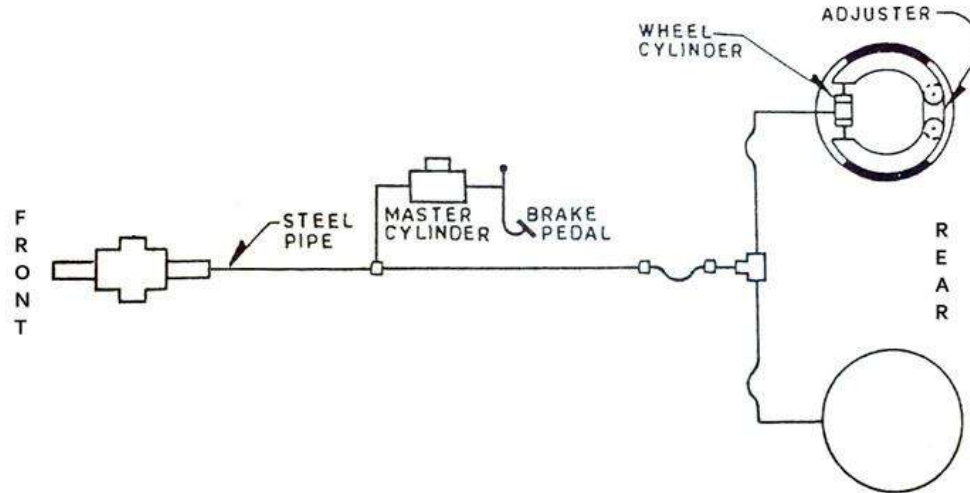
In this system the brake is operated with the help of exerted oil pressure, while master cylinder and wheel cylinder is most important components. The master cylinder, which contains reservoir for the brake fluid. Master cylinder is operated by the brake pedal and is further connected to the wheel cylinders in each wheel through steel pipe lines.

Working

When driver presses the brake pedal, the pistons in the master cylinder are activated, causing force act on the brake fluid. This force creates pressure in the master cylinder. The master cylinder converts pedal force into hydraulic pressure to operate the brakes. This oil pressure is sent to wheel cylinder through brake lines and then starts the brake actuation process.

The actuation of these mechanisms forces the Piston in wheel cylinder get expands due to oil pressure, brake pads and brake shoes linings expand against the disc or drums and rub on it to stop the wheel so that brake will get apply. When the brake pedal is released, return springs move the pistons back to their original positions and brakes are released.

Advantages:

- Equal braking effort to all wheels.
- Less rate of wear
- Easy Force multiplication
- The system is mostly self-lubricating.

Disadvantages:

- Even slight leakage of air into the breaking system makes it useless.
- The brake shoes are liable to get ruined if the brake fluid leaks out.

<u>FEATURES CLOUD BASED MOBILITY PLATFORM FOR VEHICLE TRACKING</u>

➢ **Real-Time Tracking & Emergency Response:** Satellites capture positioning data on real-time locations,gathering important diagnostics accessible via any mobile device and providing diagnostics about commercial and personal vehicles.

➢ **Mobile Alerts :** With real-time vehicle tracking systems, you will receive notifications to your mobile devices about any situations. such as any accident or mechanical breakdown and acts as a theft deterrent if the vehicle has been tampered

➢ **Productivity & Safety Monitoring:** Cloud based mobility system calculates estimated arrival time, no matter the traffic, or other circumstances. These also help determine whether delays are due to extended breaks,personal activities or environmental factors.

➢ **Route Mapping:** Cloud based mobility tracking system can minimize any disruptions caused by Traffic accidents, road construction by creating route maps with the best approaches. Route mapping identifies the most direct way and stops.

➢ **Vehicle Maintenance Reminders & Scheduling:** Regular reminders of when to service vehicles are important, and can help to avoid costly maintenance repairs and replacement parts, and lower insurance premiums