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[ijirset@gmail.com](mailto:ijirset@gmail.com)

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# Electric Traction System

**Anisa Pathan, Pooja Mulik, Prof.N. S. Mulla**

T.Y. B. Tech Student, Department of Electrical Engineering, Nanasaheb Mahadik College of Engineering Peth,  
Maharashtra, India

T.Y. B. Tech Student, Department of Electrical Engineering, Nanasaheb Mahadik College of Engineering Peth,  
Maharashtra, India

Department of Electrical Engineering, Nanasaheb Mahadik College of Engineering Peth, Maharashtra, India

**ABSTRACT:** Electric traction is meant for locomotion in which the driving (tractive) force is obtained from Electric motors (called as traction motors). It involves utilization of electric power for traction Systems i.e., for railways, trams, trolleys etc. There is a wide variety of electric traction systems Around the world and these have been built according to the type of railway, its location and the Technology available at the time of the installation.

Here we are discussing about needs electric railways, whole process, working, advantage and Disadvantage and conclusion of electric traction system. Electric traction involves utilization of Electric power for traction system, i.e., for railways, trams, trolleys, etc. There is a wide variety Of electric traction system around the world and those have been built according to the according To the type of rail, its location and technology available at the time of installation. Here we are Discussing about electric traction, whole process, working, advantage and disadvantage, types of Collectors and conclusion.

## **KEYWORDS:**

1. Traction Motor: The Motor Used To Drive The Vehicle.
2. Pantograph: A Device That Collects Power From
3. Overhead Lines.Overhead Line Equipment (Ole): Infrastructure Providing Power Through Overhead Wires.
4. Power Supply System: The System That Provides Electrical Energy To The Traction Motors.
5. Catenary System: Overhead Wiring System Used To Deliver Electrical Power To Trains.
6. Inverter: Converts Dc To Ac Power For Use By The Traction Motor.

## **I. INTRODUCTION**

TRACTION Driving forward of vehicle is called traction and the system, which employs this Type of mechanism is called traction system.

Classified broadly into two groups namely:

1. Non-electric traction systems
2. Electric traction systems

### **1.1 Electric Traction**

The system which use electrical power for traction system ie. For railways, trams, trolleys, etc. Is Called electrical traction. OR Electric traction means a locomotion in which the driving force is Obtained from electric motors. Electric traction will continue to play a dominant role in the Railway since it is an environmentally clean technology compared to diesel traction and also its Running cost is low. There are many advantages of electric traction over other forms of Locomotion.

### **A Brief History To Electric Traction**

The year 1881 saw the birth of the first electric Railway run by a German Engineer Werner Van Siemens using both the rails to carry the Current.Finding this a little too dangerous, Siemens soon adopted the overhead Electric wires.Electric traction was introduced on Indian Railways in year 1925 on 1.5 KV DC and the first Electric train ran between

Bombay's Victoria Terminus and Kurla, a distance of 9.5 miles. The first train run using 25kV AC was on December 15, 1959.

#### Voltages Used For Electric Traction In India

Typical Voltages used for electric Traction are 1.5kV DC and 25kV AC for mainline trains. Calcutta had an overhead 3kV DC system until the '60s. The Calcutta Metro uses 750V DC

Traction with a third-rail mechanism for delivering the electricity to the EMU, The Calcutta trams Use 550V DC with an overhead line (catenary) system with underground return conductors. The Delhi Metro uses 25kV AC overhead traction with a catenary system.

## II. RELATED WORK

The system which use electrical power for traction system i.e. for railways, trams, trolleys, etc. Is called electrical traction. The track electrification refers to the type of source supply system that is used while powering the electric locomotive systems. It can be AC or DC or a composite supply.

Selecting the type of electrification depends on several factors like availability of supply, type of an application area, or on the services like urban, suburban and main line services, etc.

The three main types of electric traction systems that exist are as follows:

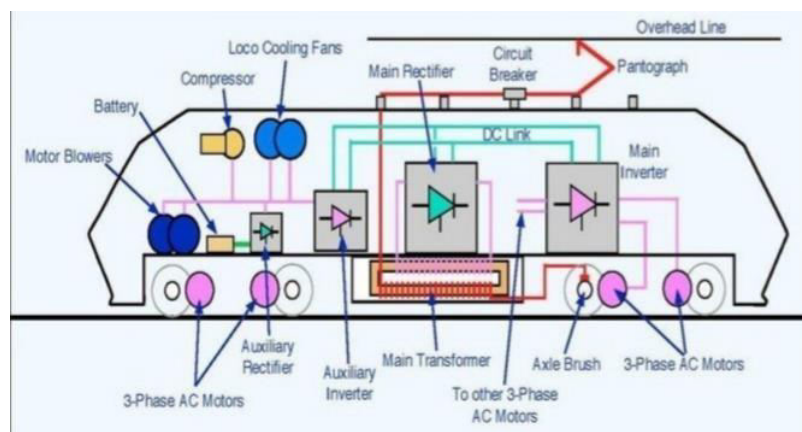
Direct Current (DC) electrification system Alternating Current (AC) electrification system Composite system.

## III. METHODOLOGY

The traction control system (TCS) detects if a loss of traction occurs among the car's wheels. Upon identifying a wheel that is losing its grip on the road, the system automatically applies the brakes to that individual one or cut down the car's engine power to the slipping wheel. If the wheels lose their grip on the road, it can lead the car to be unstable, resulting in a dangerous situation. Such traction loss commonly occurs on snowy or icy roads and in rainy weather.

Kia's compact SUVs, including the Seltos, offer a feature called the "Multi-traction control," which adjusts the wheels' traction according to circumstances. The technology reduces wheel slippage off-road by actively controlling the traction force of the front wheels through the TCS. Thanks to this new technology, it even allows compact SUVs to drive on snowy, muddy, and sandy roads with only the front two wheels.

## IV. EXPERIMENTAL RESULTS



Electric locomotive have been providing howling power since 1837. Unlike steam and diesel Locomotive, electric locomotive do not carry fuel or energy source. The energy that drives the May be located from 100Km away itself. Electricity produced at distance power station is Conveyed to the locomotive through catenaries. An electric locomotive



essentially a box of Transformers and semiconductors. A pantograph collects electricity from overhead wires and Transfers it for transformer, which sets electricity power for desired voltage. The connection with Axel brushes completes the circuit. From the transformer alternating current (AC) drawn from Overhead wires is transferred to main rectifier, which converts it to direct current (DC). The Main and auxiliary inverters convert DC into three phase AC. The three phase AC powers the Traction motors which than drive wheels. For the traction motor efficiently drive wheels many Small but important components are also needed. Auxiliary inverter and rectifiers power the Smaller components. Transformer and rectifiers produce lot of heat and have to be kept cool.This important job is done by cooling fans, which are powered by auxiliary inverter. The Compressor is also powered by auxiliary inverter, supplies the air at required presser to operate Pantograph. A battery provides power for start of supplies also supplies essential circuits. The Battery is usually connected between DC controlled supply circuits. Finally traction motors also Produce lot of heat and requires cooling. The traction motors are cooled by separate cooling fans,Which draws power from auxiliary inverter and rectifiers. So that's how electric locomotive Works

## **V. CONCLUSION**

Now a days for signaling purposes, trains are monitored automatically by means of TRACK CIRCUIT. Track circuit play important role in stop accidents, traffic. Also subsequent amount of Saving is obtained in consumption of coal which is depleting at a rapid rate, leading to energy Conservation energy and cost saving.Finally, I can conclude that electric locomotives are playing a vital role in the railway systems Till now. The use of electric locomotives primarily came in order to reduce problems of smoke Pollution. Though electric locomotives are more efficient than the steam and diesel locomotives Electrification of railway lines is expensive.

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