

# Putting The Brakes On Accidents: How To Prevent Brake Failures?

**India is plagued by an alarming number of road accidents every year. Road safety continues to be a major developmental issue, a public health concern and a leading cause of death and injury across the world writes **Dinesh Dani**, Chief Technology Officer, EKA Mobility.**



dinesh-dani-aa454026

**A**t least one out of 10 people killed on roads across the world is from India, according to the World Health Organization (WHO). With just one per cent of the world's vehicles, India accounts for 11 per cent of the global deaths in road accidents, according to a report by the World Bank. The issue of road safety becomes even more important for India, having one of the largest road networks in the world. The reasons for these accidents are multifaceted, ranging from over-speeding, overloading, distracted driving, drunk driving, bad road conditions, and poor vehicle maintenance to inadequate driver training.

Despite the continuing efforts of the government in this regard, we have not been able to register significant progress on this front. While the government is focused on improving road conditions, raising awareness, and improving infrastructure, it is crucial to address the underlying issues as the majority of these road accidents are caused by brake failures or poor vehicle maintenance.

## Inadequacy of Indian regulations for brakes

- Although we follow international safety regulations in India, there is further scope for enhancement. The conformity of production by vehicle manufacturers concerning CMVR approvals is an essential step.
- The present regulations for brakes safety and peak performance requirement for trucks, passenger vehicles, and agricultural tractors are different, which uses the equal privilege of public road use, but have different regulatory safety levels.
- The peak level performance of brakes as stipulated in regulation is lower than what can be further achieved by road adhesion. An enhancement of 20 per cent is required.
- The regulation is insensitive to changes emerging due to enhanced road facilities, the requirement for higher speeds, changes in automotive technology, and various applications in use.
- The law for restricting overloading on vehicles is not yet fully effective and lacks compliance, leaving unsafe overloaded vehicles on the road.
- A higher-power engine enhances grade climbing and overloading ability. Typically, vehicles can climb a 25-30 per cent gradient, and hand brake regulation demands only 18 per cent holding capacity. Vehicles are unsafe in hilly operations under this situation. The regulation permits high brake-pedal force for braking of payloads valued at 50 Kg and 70 Kg. Vehicles designed to such a level of brake pedal efforts are unsafe and stretch beyond human muscle power.
- No regulations govern oil spillage on roads. With oil spilt on the road, not only braking but a drive without braking is equally unsafe.

- In India, the change of regulations is a difficult and time-consuming process. It takes three to five years to come into force. Implementation of changed regulations is delayed by vehicle manufacturers and time buying is a common practice by challenging change in the court. Changes are dominated by vehicle and component manufacturers. Commercial implications are at the top of the mind rather than enhancing the safety of vehicles.

### Vehicle tampering by customers affecting brakes safety

- Suspensions are modified to carry more load, whereas brakes cannot be enhanced, making vehicles unsafe for braking at overloads.
- Fitment of equipment like an air horn, pneumatic door operation, retrofitment of pneumatic suspension, does not cater to the adequacy of air tank and compressor capacity. In city bus applications, frequent door opening and closing deplete air pressure fast, making brakes unsafe in crowded city areas. Enhancing air tank and air compressor capacity is the subject of discussion at vehicle manufacturers for years together.
- Disconnecting load-apportioning equipment like LCRV is leading to unsafe braking in an unladen state.
- Disconnecting exhaust brakes leads to overheating of brakes and a reduction in braking ability.
- Removal of the speed limit.
- Fitment of spurious brake linings and poorly retreaded tyres.
- Disconnection of hand brakes.
- Desperate cost reductions by OEMs – This leads to reduced safety and braking ability of vehicles in many cases.

### Driver's unsafe habits for poor braking

- Running the vehicle in neutral or in higher gears on down decent. This leads to overheating of brake drums and reduced brake ability on wheel brakes.
- Parking the vehicle in gear without hand brake application.
- Adjusting brake gap even with an auto adjuster to the mechanic's perception of a good brake gap by manually overriding the auto adjuster.
- Ignoring failure indications and continuing to drive the vehicle in a state of partially failed brake condition.
- In Multi-Axle Vehicles (MAVs), loaded trucks are run with the one-axle in a lifted condition. This is to save on tyre replacement costs. Here the contribution in braking by the lift axle is not available, resulting in inadequate braking ability and a higher damage rate.
- After a long descent on a slope, the brakes are required to be cooled down to gain braking capability, which is not followed.
- Prolonged driving hours without adequate rest for the driver.

### The long-distance down slopes and hill descents

- Vehicles need to have effective auxiliary brakes like exhaust brakes, engine brakes or retarders as assistance to main brakes. Due to cost implications, there is a reluctance to provide such equipment by OEMs.
- Inadequate testing and validation by OEMs for such usage.
- On long descent, if the driver notices brake failure, there is no parking place or shunt track with sand or gravel to take the vehicle out of the main traffic

flow safely, compelling the driver to keep descending in an unsafe manner or parking in the main lane of the highway.

### Inadequate brake equipment capability

- Brake equipment provided by OEMs is just adequate to meet regulations.
- In tractor-trailer MAVs, only tractor-axle brakes are from reputed brake manufacturers and trailer brakes are left to unorganised sector brake manufacturers.
- Air compressors and air tank capacities are just adequate. No surplus margins are provided for any over-usage.
- Heavy roof loading by luggage, heavy traction batteries, and CNG gas cylinders reduce brake safety considerably. Brake equipment provided by OEMs is not factoring adequately such loads in the brake design.
- In deep mine applications, for dust suppression, a lot of water is sprayed over the raw road. The excess water sprayed reduces braking safety.
- Wires and tubes are neglected design areas, which risks brake safety after some use. Tubes/hoses/wires cutting due to rubbing with nearby parts is a common observation.

### Out-dated designs of brakes

- Keeping up with technological advancements, there is a dire need to upgrade the efficiency, reliability, and durability of braking systems. The legacy of age-old designs is still in continuation. S-Cam brakes are a lead example. With some cost increases, there is ample scope to bring better designs, which will enhance safety.
- Disc brakes offer more stable braking for high speeds and gradients.

Due to high-cost reasons, disc brakes are not in practice, as much as they should have been.

- Brake drums/discs and linings manufacturing is in the hands of unorganised vendors in many cases, who do not even have adequate metallurgy laboratories and test facilities.

### Driver comfort and ergonomics for trucks

- On paper, OEMs can show a very good comfort index, but in reality, very few trucks have comfortable cabins on the road.
- As the driver is not the owner of the vehicle, higher-cost comfortable cabins are not purchased by owners.
- The driving profession is left by drivers after the age of 50 due to permanent disabilities originating from uncomfortable prolonged driving.
- A lower level of cabin comfort results in unsafe driving by the truck/bus driver.

### Inadequate accident investigations

- The investigations are restricted to settling insurance claims.
- Vehicle manufacturers do not participate in accident investigations to review design safety enhancement.
- Road constructions responsible for unsafe braking are not adequately reviewed or rectified timely.
- Defective brake parts, if found responsible for the accident, are destroyed without further preventive actions.
- In CNG buses, gas leakage and trapped gas in the rear body portion triggers fire with overheated rear brakes.

### Errors at vehicle building by vehicle manufacturers

- Inadequately set brakes, on new vehicles, leaves inadequate drum to lining contact and lead to inadequate braking on new vehicles.
- Imbalance in the LH side and RH side affects brakes performance.
- Combination of different brakes system manufacturer's parts, where the combination is not adequately validated.

### Driver training by OEMs

- Drivers need to be trained by OEMs for safe driving. If drivers continue to learn on trucks with actual driving, the safety of other road users is at stake. Brake maintenance should be an essential part of the driver's training.

### Truck vehicle passing formality

The notional passing formality at present should include:

- Whether the vehicle is left with the same brake equipment as per CMVR compliance.
- Whether all failure indications are functional

### Agriculture tractor brakes

- Brakes are not provided on front axle wheels. Dead weights are added to increase the front axle load. Part of the weight can be utilised to have brakes on the front wheels.
- The tractor weight goes very high when coupled with trollies. There are no brakes on the trolley wheels. The combination is unsafe for braking. Trolleys are to be

mandated to have brakes.

### Huge variety of applications in practice

- Bodybuilders and truck users are at liberty to build applications, crossing the safety limits of brakes.
- All body buildings for applications must be approved through the safety requirements of brakes as per CMVR requirements.
- Surface tippers are deployed in deep mining operations. The brakes on surface tippers are not equipped for that kind of terrain, causing accident-prone vehicle operations in mines.

### Poor rural penetration of OEM service and spare parts

Customers from rural peripheries are forced to fit spurious spare parts as genuine parts are not available. The inadequate service network as well as knowledgeable personnel availability in the rural areas leads to running vehicles in an unsafe mode. With the aforementioned measures in place, the number of accidents due to brake failures can be significantly reduced. Furthermore, driver training and education also play a significant role as this lack of knowledge can lead to panic and incorrect actions in the event of a brake failure. It is essential to promote proper vehicle maintenance and inspection, and ensure the use of high-quality brake parts, besides investing in a better road infrastructure. **ACI**

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