

# Development and Fabrication of MAC Technology for a Vehicle to Control Roll Back Effect

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**Abstract** - In this research a new mechanism is developed to control the roll back effect which is caused in automobile during the hill road drive. This paper gives a new method for controlling roll back effect by introducing MAC Technology in a vehicle. MAC Technology consist of a mechanism which can operate both clutch and break by single pedal, By implementing this technology in vehicle we can observe one more pedal beside the clutch pedal which is named as MAC pedal, MAC Technology can control the roll back effect at the time of movement whether moving forward or backward. It is the main advantage of MAC Technology when compared to existing techniques. MAC Technology and its mechanism has been fabricated and tested on a vehicle.

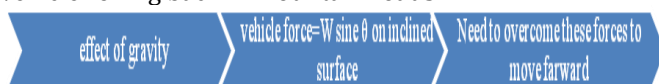
**Key Words:** MAC (Manual Actuated control), Anti Roll Back Effect

## 1. INTRODUCTION

The entire research is to control the roll back effect and is aimed to reduce the accidents caused during the drive on the hill roads. This research paper gives one more solution to control the roll back effect by developing MAC Technology. Manual Actuated Control (MAC) mechanism operates by taking manual input according to the requirement.

## 2. PROBLEM STATEMENT

The problem which we identified to resolve was vehicle rolling back in mountain roads.



- In the hill roads a common problem encountered by the driver is to move the car from rest position or from parking on slant surface.
- When a vehicle moving on hill road in traffic the vehicle needs to be driven slowly this is the one more situation faced by a driver to control the car from rolling back.

## Driving module-1

To start the car from rest position or from parking on a slant surface driver has to hold the clutch pedal

(Disengage) and brake pedal (Engage), shift the gear from neutral to then first gear, disengage the brake, engage the clutch and accelerate the vehicle. Meanwhile there is a possibility of the vehicle rolling back due to disengage of brakes. The driver has to control clutch, brake, and accelerator while changing the gear all at one point of time. Failure of any one of these leads to hit any vehicle behind by this module of driving, driver may feel nervous. The aim of this research is to provide a safer and comfortable ride for the driver on inclined roads with low cost and easy maintenance.

## 3. LITERATURE REVIEW

Cook George developed a hill holder mechanism which can hold the vehicle on slope road surface for two seconds by using the brake pressure by developing Anti-creep and hill holder brake system. This system helps to hold the vehicle while driver disengages the brakes and getting to operate the accelerator [1]. William Kent developed a new system by giving input to system by utilizing a load sensor connected to a wheel brake to detect a change in wheel braking torque and transfer responsively with a mechanical brake control device to actuate [2]. Grzegorz Janiszewski stated that by using the piston cylinder, which is controlled by an electronic unit is coupled to a pressurized hydraulic system and effects to hold brake pedal for two seconds [3]. William K. Messersmith approach a new method to hold the vehicle by applying brakes for controlling roll back effect by using the load cell with electrical control. This system needs continuous power source for the operation and display outputs, inputs [4]. Alvin H. Berger used a one-way clutch when engaged it will protect the vehicle from roll back effect [5]. A. Arunkumar, T. Muthumani, V. Balasubramani developed a Ratchet and Pawl mechanism to arrest backward motion to the front axle when vehicle gets to roll back [6].

## 4. WORKING OF MAC TECHNOLOGY

In this Research, MAC technology is developed to control the roll back effect of vehicle and also aim to provide a comfort ride for a driver. By understanding the existing technologies and by determining the actual requirements finally MAC technology was developed. In MAC fitted vehicle one more pedal is placed beside the clutch pedal and is named as MAC pedal; it has the mechanism to operate both clutch and brake at a time. Two pulleys with different

diameters are attached to the clutch and brake pedals with high strength cables, these two pulleys are mounted on common shaft which is giving support by end bearings. MAC pedal is connected to the shaft to make the pulleys rotate in clockwise direction, This movement of pulleys helps to disengage the clutch and engage the brakes, then driver can shift the gear from neutral to first gear ratio, By operating these two pedals (MAC pedal and accelerator) driver can have an ease to move the vehicle from rest position without rolling back of vehicle.

### 5. DEVELOPMENT AND FABRICATION OF MAC TECHNOLOGY

The mechanism is designed for TATA SAFARI DICOR which is designed with hydraulic braking system and multi plate clutch. The dimensions of the cabin and actuated lengths of clutch and brake pedals are measured. According to the dimensions MAC Mechanism is fit to the car and run successfully.

#### 5.1 Components of MAC Technology

Entire construction of MAC technology consists of two pulleys and a shaft, bearings, Foot pedal, Retraction springs.

#### Materials Required

- Pulleys : Gray cast iron Dia. of 13& 10 Inch
- Shaft : High carbon steel
- MAC Pedal : MS



Fig1: Pulley



Fig 2: Shaft

#### Specifications of vehicle

- Vehicle Type: Tata safari
- Engine displacement =2179cc
- Maximum Torque = 320Nm at 1700-2700 rpm
- Gross weight=2650Kg

### 6. Results



MAC: MAC pedal, C: Clutch pedal, P: Pulley, B: Brake pedal, A : Accelerator pedal, S: Shaft

Fig 3: MAC Technology construction in vehicle



Fig 4: Arrangement of MAC pedal in Tata safari

### 7. Conclusion

MAC technology is fabricated and installed in the above mentioned vehicle and is running successfully. This mechanism is very simple to implement in existing cars without modifying any component of vehicle. The cost and maintenance are very less. Finally it is proved that this technology will work efficiently to control roll back effect.

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