

A Review on Present Trend in Speed Bump

KSB Prasad, S. Naveen Kumar, D. SARAVIND Varma

Abstract: This technical paper deals about the reducing the over speeding vehicles by using smart speed bump. According to the Ministry of Road Transport and Highways of India on 2016 survey statistics 9583 road accidents are occurred on speed bump in which 3396 are killed. In order to reduce impact caused by conventional speed bump replaced by smart speed bump It is formed by flexible material made up several hollow slots or unique slot. Each slot is filled with impregnated Shear thickening fluid (Non-Newtonian Fluid) the main principle involves here is pressure acting on the Material strip then the fluid acts itself as resistance against the pressure. When the tire pressure act on strip with low speed then automatically the viscosity level in the strip reduces, strip easily deformed vehicle will moves smoothly And another side if vehicle moves with high speed than it required it will act as a Rigid obstacle for high speed .Due to change in viscosity due to sudden tire pressure act on the strip. Where as in conventional speed bump the vehicle has to slow down in order to prevent damage of the vehicle. However the smart speed bump is sensitive to the speed of the vehicle. Vehicle need not be halt down unless if the vehicle is coming at the high speed. It will give more pleasure and comfort to the driver.

Keywords: Non-Newtonian fluid, Speed bump, Reduce impact, Viscosity level

I. INTRODUCTION

The conventional speed bump is built up with asphalt or concrete laid on the road. They are causing high discomfort for road users eventually the vehicle should be stopped at speed breaker .these conventional speed breakers shows impact on the vehicle components and creating a tolling action .In order to reduce these factors the conventional speed breaker is replaced with smart speed bump .The ideal situation involved in this conventional speed bump is when the vehicle is in slow motion the stiffness of obstacle is reduced and vehicle can moves smoothly another hand when the vehicle is in fast motion the obstacle acts as a hard and it again acts as conventional speed breakers for high speed vehicles .the conventional speed breakers permanent fixtures and dismantling of these fixtures are difficult in nature on the other hand these smart speed bumps are mobile in nature it can assembled in 30 minutes. For conventional speed bump Response time is slowed by 3–5 sec. on one speed bump. If it goes on for emergency vehicles the patient condition will be

in danger. The “Smart Speed Bump” aims to overcome all these comings of the conventional speed breakers

A. Design and Implementation

Speed Bump – Body and Containing Fluid The speed Bump contains an outer shell and a bottom plate. The bottom plate contains fastening holes when an emergency vehicle comes over the speed bump, the fluid should escapes from the tubes and vehicular should move out smoothly, so that response time of emergency vehicle will reduce .the pump is required to pump out the fluid. The pump parts like vane , piston, impeller pushed out of the way .the progressive cavity pumps are utilized in this system .in this pump the small discrete cavities , as it rotor turned The volumetric rate is directly proportional to rotational rate these pumps have application in fluid pumping and metering of viscous materials. Progressive cavity pumps can ensure optimal pumping of a fluid with in short period So that the device can be either permanently or temporarily fixed on the road surface The shell can be formed of any conventional material, such as but not limited to flexible or resilient materials including or rubber The inside shell contains compliant material such as a Non Newtonian fluid, which reversibly hardens or stiffens in response to an applied pressure and goes back to its original form. The housings are in the form of elongated, hollow, flexible tubes having closed ends. The tubes are manufactured by either polymeric, rubber material. The flexible tubes are filled with a Non Newtonian fluid and interconnected With a conduit which enables the controlled flow of the fluid in or out of the chamber If the vehicle travels at a slow speed, fluid is moved to the adjacent chamber and a depression of the strip takes place in the area in which the wheels pass over, forming a small obstacle to the passage of the vehicle. However, if the vehicles are on high speeds the response time fluid to transfer to the adjacent layers is less so the speed bump will act as a rigid obstacle. The main principle involved in this design is change in viscosity by Non Newtonian fluid .As the shear stress increases the shear rate also increases. The fluid we used here is Shear thickening fluid

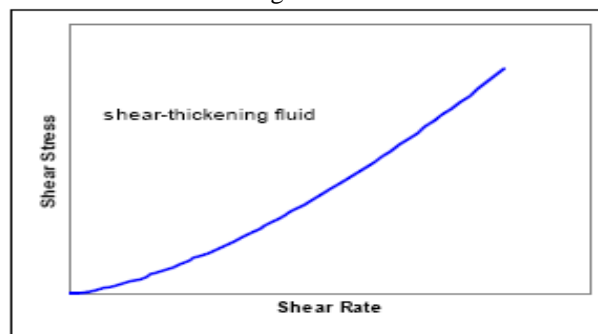


Fig 1.Fluid Behavior

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* Correspondence Author

KSB Prasad*, Assistant Professor, GMR Institute of Technology Razam (A.P), India.

S Naveen Kumar, Assistant Professor, GMR Institute of Technology Razam (A.P), India.

D SARAVIND Varma, P.G Student, GMR Institute of Technology Razam (A.P), India.

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The Non-Newtonian fluid acts itself as a resistance controller in the strip depending up on the vehicle speed of impact. when the vehicular at the low speed the strip get easily deformed on the other hand when vehicle moves with high speed the strip will act as a rigid obstacle.

B. Pumping System

When an emergency vehicle comes over the speed bump, the fluid should escapes from the tubes and vehicular should move out smoothly, so that response time of emergency vehicle will reduce. the pump is required to pump out the fluid. The pump parts like vane , piston, impeller pushed out of the way .the progressive cavity pumps are utilized in this system .in this pump the small discrete cavities, as it rotor turned The volumetric rate is directly proportional to rotational rate these pumps have application in fluid pumping and metering of viscous materials. Progressive cavity pumps can ensure optimal pumping of a fluid with in short period

C. Emergency Vehicular Detection System

An emergency vehicular detection system for alerting the speed bump for approaching emergency vehicles is fixed near the bump. The sound detection system should assembled. It consists of sound transducer which is for detect the sound signals. The sound system is already installed by different formats of various emergency vehicles sirens. The sound waves from the siren of the emergency vehicle are received by the sound signal detection unit. A signalized comparator is attached to the sound transducers for comparing the current units from the transducers to preprogrammed patterns It is essentially a sound signal detection unit. The sound signal detection unit should have at least sound transducer for detecting sound waves (signals) and producing an electric current upon detection of a wave signal. If the comparator finds the matching pattern then it encodes the signal and transmits to the pump. The pump pumps out fluid into the reservoir .The bump get deflates and the emergency vehicles can move freely without slow down and the time can be eventually reduces

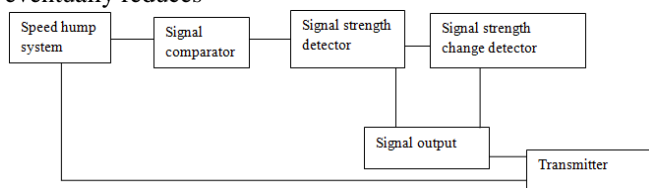


Fig 2. Emergency vehicle detection system

D. Reflector Plates

Reflector plates are acts as a safety Reflector leading to the Speed Bump. The safety reflector intended for runners, pedestrians, non-motorized, motorized vehicles.it acts as a visual aids for vehicles in night times. The reflection takes place by the vehicular head lights pedestrians, runners, motorized and non-motorized vehicles. It aids visibility of a person or vehicle, as it reflects light from headlights of vehicles. Due to the change in orientation of the other inside faces, the light internally reflecting Is projected back out the frontal of the reflector in the direction it came from. Then it alerts the person close to the light source, So that the driver of the vehicle can identify presence of the speed Bump.

E. Operation of Entire System

The speed bump can be Fixed permanently or temporarily on street or road ways. The shear rate is predetermined with respect of speed .When the tire rolls on speed bump the shell undergoes compression and the fluid transfer to Reservoirs. After vehicle passed the shells attains its original position. If the shear rate more than the critical shear the bump will acts as rigid obstacle. In this case the driver feels the conventional speed bump. If the shear rate is less than the critical shear then the speed bump do not acts as a obstacle In this case the driver feels comfort and pleasure, the vehicle need not to be slow downed

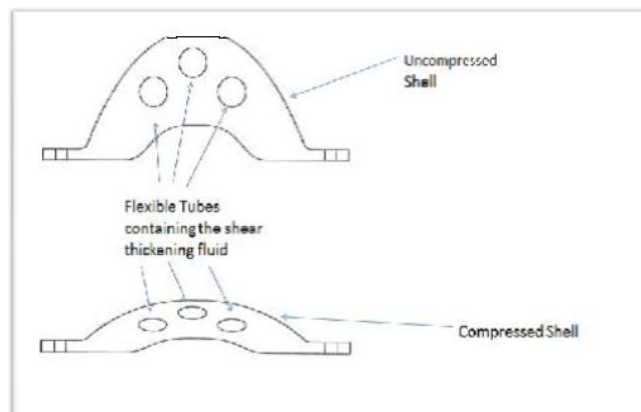


Fig 3. Cross – Section of Speed Bump

F. Comparison Between conventional & Smart Speed bump

- In conventional speed bump it always act as rigid. whereas smart speed bump it is in resilient nature
- Conventional speed bump act as a fixed fixture. Where smart speed bump can be mobilized one place to another as per the requirement
- Wear and tear action of vehicular tyres will be high in conventional speed bump when compare to smart speed bump
- Vehicular mechanical toll action will be high in conventional speed bump when compared with smart speed bump travelled with in the speed limits
- The fuel consumption will be high with conventional speed bump because of stopping position on the other hand fuel consumption can be maintained with smart speed bump
- The Fixation & Dismantling of Conventional speed bump is Difficult When compared with smart speed bump whereas it easily fixed & Dismantled
- In conventional speed bump may scrape the under-Body of Low Floor Cars whereas smart speed bump it cannot be happen because of its resilient nature
- The smart speed bump can be environmental friendly as it can made up of Recycled rubber

II. CONCLUSION

The Smart Speed Bump can help in increasing the vehicles fuel efficiency up to a large extent. Vehicles need not come to a complete Stopping form At speed Bumps, It will reduces the traffic congestion.

It also does not take a toll action on vehicle's mechanical components, such as the shock absorbers and steering system.

The setup is completely mobile and can be installed within an 30 minutes. The installation process does not require a skilled person

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