

## NON NEWTONIAN FLUID SPEED BREAKER

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### Abstract

A speeding vehicle can be a threat to other road users particularly on roads where connection between motorized and non-motorized traffic is high, such as residential roads, school and community zones. Even though speed limit signs are located, much is left to the ethics of drivers whether they should abide by them. Hence, controlling vehicular speed is an important outcome in traffic management. One way of controlling speed is to use speed breaker which produces distress while driver experiences while crossing over it. It plays a decisive role in implementing speed limits, thereby preventing over speeding of vehicles. It considerably assists to the overall road safety objective through the prevention of accidents. Newtonian fluid speed breaker reduces the speed of any over speeding vehicles travelling on a roadway. It is formed by at least one hollow band of ductile material. Each vessel is filled with a dilatant shear-thickening fluid. If the vehicle travels at a low speed the fluid has a low viscosity and the strip is easily deformed, whereas if the speed of the vehicle is high the viscosity of the fluid is high and as a result has great resistance to deformation, thus forming a rigid obstacle to the movement of the vehicle. Drivers must slow down when driving over the conventional speed breaker to prevent damage to their vehicle. However, the Non Newtonian fluid speed breaker is sensitive to the speed of the vehicle. The vehicle needs to slow down only if it is over speeding.

### 1. INTRODUCTION

Traffic calming measures are pretty common in modern society. Traffic calming measures are physical design approach that cultivate or force motorists to drive slow and specific speed. They prevent vehicle from speeding and can increase overall road safety. Traffic

calming can also make streets more convenient and comfortable for other users such as pedestrians, cyclists and nearby residents. The main purpose of traffic calming measures is to prevent vehicle from speeding and create a safer and secure traffic environment. Speed breakers are type of measures that is constantly

used to prevent vehicle from speeding in residential areas. A conventional speed breaker usually consists of a concrete or asphalt hump construct in the road. They are designed to be driven over at a design comfortable speed, while causing exceeding agitate at higher speeds. Drivers must slow down when driving over this speed breaker to prevent damage to their vehicle. However, even if travelling at the design speed limit or below, these conventional speed breakers can take a toll on a vehicle's mechanical components, such as the shock absorbers and steering system. This research relates to a traffic control device sensitive to the speed of a vehicle. The ideal situation is that if the vehicle travels at a low speed, the stiffness of the non Newtonian fluid speed breaker reduces to ease the vehicles passes without any bounce or jump. However if the vehicle exceeds the design minimum speed the non Newtonian fluid speed breaker stiffness increases and the vehicle receive a considerable jump. This speed control device will also allow emergency vehicles to pass speed breaker without having to reduce their speed which in turn will reduce their response time to emergencies.

## **2. RELATED WORK**

To respond to this need, the ministered des Transports du Québec has be gun publishing a series of fact sheets on a variety of traffic calming measures

including: speed humps and speed cushions, raised crosswalks and intersections, neck downs (curb extensions at intersections), the reduction of the width of streets, centre islands and chicanes. A general fact sheet present all of the measures and notably outlines the procedure for pre-implementation analysis. Each fact sheet earmark to an individual measure outlines the implementation context, advantages and disadvantages, geometric characteristics, effectiveness at reducing speed, and maintenance requirements, including winter maintenance. The presentation will present the first two published fact sheets: the general fact sheet and the fact sheet on speed breakers and speed cushions. The fact sheets as well as examples of measures implemented in municipalities are available on the ministered des Transports website at under Partenaires – Municipalities – Securities routière. Speed control is a key factor in road safety. It is for this reason that the ministered hopes to support municipal initiatives related to the use of traffic calming measures. By issuing these fact sheets, stakeholders will have easy access to pertinent information as well as concrete examples to help them design the solution best suited to every situation. In the residential zones where a large number of pedestrians and other vulnerable road users are expected, like

school zones, it is necessary to decrease the speed to such a level that the risk of susceptibility is the lowest possible. One of the commonly accepted and often implemented speed decrease measures is vertical rising of the road pavement (speed bumps, speed humps, etc.). This work shows the affects of speed bumps of different heights (3, 5 and 7 cm) to the decrease of vehicle speed. Speed measurements had been done before speed breakers were installed, 1 day and 1 month after the installation. Applying ANOVA analysis and post hoc analysis, using Turkey–Kramer’s multiple comparison test, a comparison was made of mean, 50th percentile and 85th percentile speed, before and after speed bumps setting. It has been shown that there is a eloquent speed decrease on the places where speed bumps were set, compared to the period before setting. Based on the research results, it was suggested that on the locations where susceptible road users are extremely endangered, speed bumps 5 and 7 cm high should be set, whereas at less endangered locations speed breakers 3 cm high could be set.

### 3. IMPLEMENTATION

Speed breakers were back breakers and also cause damage to vehicles ,means it reduces the life of the suspension of the automobiles , as they were either too small and bumpy or too high. If the speed

breakers don't have proper illumination and placed in roads that people usually speed up, there is a risk of accident. In fact, elderly get a jolt and those with osteoporotic bones suffer a lot of strain on their back bone. Hence there is a need for an alternative for this problem. We usually see that conventional speed breakers cause damage to vehicles, People suffer a lot of strain on their back bone, cause spinal damage and cause accidents. the speed breakers don't have proper illumination and placed in roads. Thus our aim for the safe and alternate source like Non Newtonian Fluid speed braker . The Non Newtonian fluid present in the speed braker which is flexible helps reducing maximum problems when compared to the conventional speed braker. Thus providing us the safe and comfortable speed brakers. We usually see that conventional speed breakers cause damage to vehicles, People suffer a lot of strain on their back bone, cause spinal damage and cause accidents. the speed breakers don't have proper illumination and placed in roads. Thus our aim for the safe and alternate source like Non Newtonian Fluid speed braker . The Non Newtonian fluid present in the speed braker which is flexible helps reducing maximum problems when compared to the conventional speed braker. Thus providing us the safe and comfortable speed brakers.

1. The speed breaker must be easily used by everyone..
2. If any problem arises it should be easily repaired.
3. easily portable.

#### **Requirement Analysis:**

- ❖ NON –NEWTONIAN FLUID
- ❖ SYNTHETIC RUBBER
- ❖ ARCYLIC
- ❖ METAL PLATE
- ❖ KEVLAR
- ❖ NUTS & BOLTS

#### **4. EXPERIMENTAL RESULTS**

The speed breaker includes an outer cover and a bottom plate. The bottom plate may include more than one fastening holes. The breaker can be either permanently or temporarily placed to a roadway with bolts, screws. The cover can be formed of reinforced rubber material. The cover encloses with Non Newtonian fluid, which reversibly hardens or stiffens in response to an applied pressure and goes back to its original form when the pressure is relieved. The housings are in the form of elongated, hollow, flexible tubes having closed ends. The tubes are made up of either polymeric or rubber material. The flexible tubes are filled with a non Newtonian fluid .If the vehicle travels at a low speed, fluid is moved and breaker is deformed, depression of the strip occurs in the area in which the wheels pass over, forming a small obstacle to the passage of

the vehicle. However, if the speed of the vehicle is high then the fluid has no time to displace and a considerably smaller depression occurs. Hence the strip forms a step with greater height, causing the vehicle to jump, warning the driver about his excess speed. The fluids used to fill the housings are non-Newtonian fluids. A non-Newtonian fluid is a fluid the viscosity of which varies with the pressure gradient applied. As a result, a non Newtonian fluid does not have a defined and constant viscosity value, like a Newtonian fluid. The Non Newtonian fluid acts like a fluid below a critical shear rate but above the critical shear rate, the material acts like a solid.The non-Newtonian fluid acts as controlling the resistance by the strip to its deformation. It depends on the speed of the wheels of the vehicle on it. Thus, if the vehicle travels at a low speed the fluid has a low viscosity and the strip is easily deformed, whereas if the speed of the vehicle is high the viscosity of the fluid is high and as a result has great resistance to deformation, thus forming a rigid obstacle to the passage of the vehicle. Thus the speed of the vehicle is controlled due to the combined effect of non-Newtonian fluids and their flow via narrow conduits.

#### **5. CONCLUSION**

Here by we conclude that our non Newtonian fluid speed breaker is a toll to

reduce damage to the vehicle and the person riding on it.

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