

Fabrication of Compact Street Sweeper

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Abstract- An understanding of pollutant characteristics on impervious surfaces is essential to estimate pollutant wash off characteristics and to design methods to minimize the impacts of pollutants on the environment. The data also show that street sweeping may have an adverse impact on pollutant wash off because the street sweeper releases the finer material but only removes some of them, making the fine sediment available for wash off by the next storm. The data also show that most of the nutrients are attached to the finer sediments, and to effectively reduce nutrient loads in particulates, treatment facilities must be able to remove the finer particles. Street cleansing is a common (and expensive) practice undertaken by most urban municipalities with annual expenditure by a municipality often exceeding one million dollars. Street sweeping, essentially the operation of large trucks for cleaning street surfaces, is primarily performed for aesthetic purposes. It is, often perceived to lead to improvements in the environmental conditions. The study concludes that the performance of street sweeping for storm water pollutant control is limited and must be accompanied by structural pollutant treatment measures to effectively reduce the discharge of gross and sediment associated pollutants in storm water. The incremental benefits in increasing the frequency of street sweeping beyond what is required to meet street aesthetic criterion is expected to be small in relation to water quality improvements. As a result, there seems little benefit in conducting an in-depth field-based study into the effectiveness of street sweeping for storm water pollution control.

INTRODUCTION

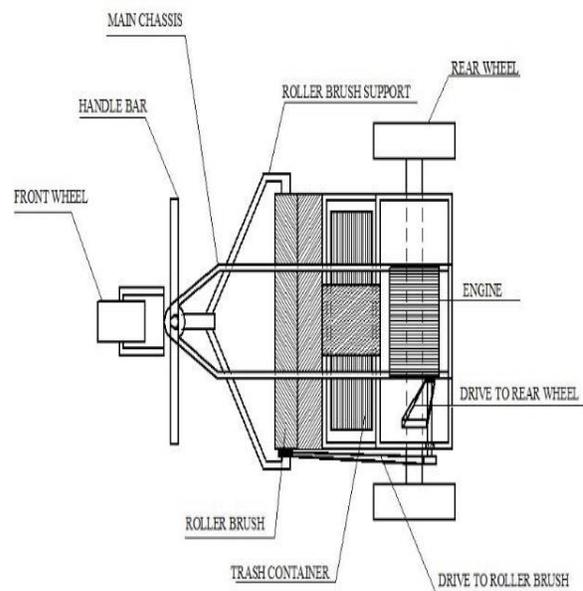
Street sweeping as a practice that improves water quality in equipment and operational upgrading that may produce more fuel-efficient sweepers, greater use of waterless sweepers or implementing new technology. Mechanical brush sweepers are effective at removing coarse materials and gross pollutants. The earliest sweepers were manual efforts using a broom, shovel with either push or horse-drawn carts. Street sweeping materials consisted of trash, dirt,

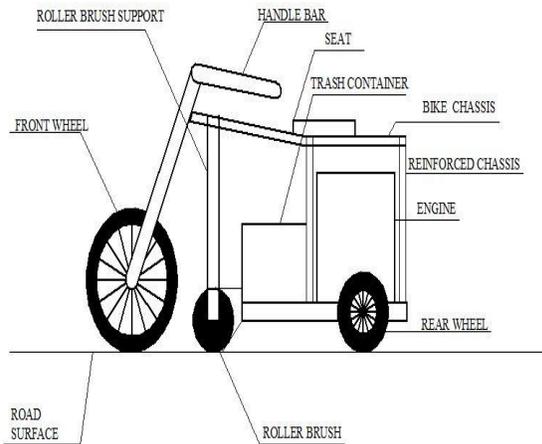
vegetation and horse droppings. Thus aesthetics and sanitation were the two driving forces for municipalities to keep streets clean and protect the citizens. The first motorized sweeper was developed in the early 20th century.

LITERATURE SURVEY

[1] describes street cleansing is a common (and expensive) practice undertaken by most urban municipalities with annual expenditure by exceeding one million dollar.[2]in the late 20th century the south coast air basin in California exceeded state and federal air quality standards for PM₁₀. [3]Street-dirt-accumulation rates, street-dirt chemistry data, and street-sweeper efficiencies can be used to estimate the potential benefits gained by implementing a sweeping program.

DESIGN OF THE MODEL





WORKING OF THE MODEL

The first mechanical street sweepers may have predated the automobile, but they would have relied on horse-drawn carts to move about the city. The street sweeper truck ushered in the use of horseless carriages (you might know them as cars) to move the street sweeper around town. As technology has improved and environmental concerns have become more important, street sweepers have become quieter, cleaner and more efficient. Some are even using alternative fuels as we continue on into the 21st century.

Uses of street sweepers have expanded along with the technology. City streets, construction sites, airport runways, never-ending parking lots -- if it's paved, it likely needs to be swept. There are portable little sweepers that can be towed to a work site and indoor versions that keep the cement floors of massive warehouses and industrial sites clean. Now that we know where they came from and how they're used, let's learn how street sweepers actually work. First, they take the broom and swish it left, then they swish it right. Nowadays vehicle looks like a cross between Zamboni machine and machine truck.

Conventional street sweepers have jets under their trucks that shoot water onto the street's surface to keep flying dust particles to a minimum, while spinning brushes scrub the dirt free from the streets and gutters. A cylindrical brush under the truck sweeps the debris onto a conveyor belt that leads to a storage container. Here in our model we use cylindrical brush beneath the vehicle frame. The roller brush is mounted ahead of trash container. We

have use roller brushes instead of regenerative air or water to get the debris into the trash container. To reduce the cost we have not used vacuum which helps in moving debris to the trash container.

This model is smaller than the big street or highway sweepers and they can also be used in industrial sites and many other sites where cleaning up of particulate is important. This activity gives us a clue about how these machines like trucks or large vehicles could be noisy.

This is mainly because they are powered by a heavy equipment diesel grade motor and also because of hydraulic system used in this large vehicles and not to mention the vibrations because of brush spinning about greater revolutions. There is lot going on in small package with very little sound damping. This is greatly achieved due to less moving parts, low rpm engines, robust and compact design, and reduced use of hydraulic system.

We call them street sweepers but the same mechanical surface cleaners can be customized to pick up just about any kind of debris from any surface. But in the present model we are greatly on particulate matter 10 (PM₁₀) that are found in streets, avenues, alleys, parking lots and side roads. Sweepers can range in size from full trucks to portable towing machines. But we place this model somewhere in between these both. One cannot sweep at 100 km/hr and hence driving speed of our model will not be more than 10km/hr. By this we come to the section wherein we provide the drive from the engine to the roller brush assembly. Here we are taking two output from the engine, one for the drive to the rear wheels and another to the roller brush. The speed of the roller brush is multiplied using 14 teeth sprocket on the driving shaft that is the output shaft of the engine and 13 teeth sprocket on the driven shaft of the roller brush. This sprocket arrangement gives the 0.7% increase in the speed of the driven shaft to that of the driving shaft which is required for our model to work efficiently. The rotation of the roller brush is in clockwise direction similar to the rotation of the wheels

The trash container of dimensions 20*20*16 inches is placed behind the roller brush with the supporting frame at the bottom. The trash container has been designed in such a way that it has a scooping arrangement at the bottom of the container with the covering at the top of the brush. When the roller

brush rotates it pushes debris from the surface of the road to the trash container with the help of scooping arrangement.

Little three-wheeled sweepers are far more manoeuvrable for cleaning between shelving units in a warehouse, for example, or any place where tight turns and limited space are an issue. Street sweepers do much more than just keep things clean. They're used to pick up trash, dirt, chemicals, motor oil and more that can contaminate the environment. If these potentially harmful substances are removed from the street, the construction site, or the parking lot before they reach storm drains, they are less likely to end up in rivers and lakes.

RESULT

For a run of 30 minutes at a steady speed of 10 kmph over a street road, the debris accumulated weighed about 2.3 kgs. The test was conducted on an even surface. The capacity of the trash container is about 10 kgs. Fuel consumption is low due to small engine and as compared to a larger vehicle that are running on street today. The manoeuvrability is rightly achieved due to proper assembly of the bike chassis into the engine frame. The primary difference between existing and compact street sweeper is the way in which they move or convey materials from the street to the Hooper or debris tank.

Compact sweepers use the main brooms bristle flicking effect to throw material from the ground to the trash container. Almost every piece of material move by the main broom is successfully moved into the trash container. It is much more efficient system than any air moving process.

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