



Design and Improvisation of Fire Fighting Bike

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AbstractThe project titled *Design and Improvisation of Fire Fighting Bike* is associated with new technique installed on the present firefighting bike. Deals with the firefighting operations with a quick response time. As identical in urban areas the narrow and crowded spaces where the movement of fire engines are not possible the bike plays the upper hand role and work as a life saver. The purpose of firefighting bike is to help the fire fighter to beat the traffic congestion and reach out the place of emergency within time. With all the required firefighting equipment required to overcome a concentrated fire. The fire suppression needs to be done at the incipient stage where the heat and flame produced by the fire is at the minimum point. The expected outcome of the project will be, to counter the fire at its initial stage for better human safety and protection.

Keywords : Response Time, Traffic Congestion, Safety Standards, Extinguishers, Nozzle System, Navigation System, Rescue.

I. INTRODUCTION

Fire bike is a vehicle which is to be designed primarily for firefighting operations. A Fire Fighting Bike is a motorcycle used by a fire department. Several countries around the world use Fire Fighting Bikes, often to beat traffic congestion, and the equipment carried ranges from simple extinguishers to jet guns with hose rigs. Firefighters also use Fire Fighting Bikes to offer medical treatment. The primary purposes of a Fire bike include transporting fire fighters to an incident scene, providing water with which to fight a fire, and carrying other equipment's needed by fire fighters. specialized apparatus is used to provide hazardous materials mitigation and technical rescue. A typical modern Fire bike will carry tools for a wide range of firefighting tasks, with common equipment including extinguishers, a water tank, hoses, rescue box, hand tools, self-contained breathing apparatus (SCBA) and medical supplies. Many fire vehicles are based on standard vehicle models and they are normally fitted with audible and visual warnings, as well as communication equipment such as two-way radios and mobile computer technology.

II. LITERATURE REVIEW

Congested roads and mounting traffic on the city have considerably increased the response time of the fire brigade in reaching trouble spots across the city.

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Sunday's fire at a go down at Tonga stand, Tiwari, one of the congested areas in the city, has once again brought to fore the need for small fire tender. 'traffic delays the response time of the department by up to 20 minutes, a dangerous delay. The ideal response time should be five to ten minutes after the call is received. when congested area are affected, it become difficult, especially when the traffic situation is bad. Proshun Chakra borty.

III. RESEARCH ANALYSIS

Need of Fire Fighting BikeA fire can start anywhere, anytime and in just 6 minutes, it can turn into an uncontrolled blaze. This make it even more important for you to tackle the fire, before it is too late. Unfortunately, narrow lanes, inaccessible roads and traffic jams all are a setback when it comes to rushing to the rescue point. Which means that by the time the large fire engines reaches to the disaster point it could very possibly already be too late. "Fire Fighting Bike" comes to rescue in such situations. It can maneuver on any road, zip through traffic and reach the disaster site in a very short time.

Features-

Capable to overcome all classes of fire.

Quick control over fire at incipient stage.

Minimum man power as against 6 persons for a standard fire tender.

No external expellant require.

Optimal utilization of water and can be refilled from any water source.

GPS for short route and location.

Minimal operational cost.

Continuous Operation.

Economical and eco friendly.



Figure1.1: Extinguisher Installation

Engine

Yamaha Enticer is a cruiser motorcycle, sold few years back in the entry level motorcycle segment in India. It is powered by a 200 cc, air cooled engine that produces 11 BHP at 8000 rpm and

10.4 Nm at 6500 rpm. It weighs just 115 kg and was preferred because of its peppy nature and easy riding dynamics. The top speed of the same is claimed to be 112 mph while its rival Bajaj Avenger in terms of design.

Tool Box

Tool box is a box which contains all the necessary items that are used or to be needed in case of emergency. Following are the list of items present in Tool box-

First Aid Kit

15 m Hose

Fire Blanket

First Aid Kit (should be according to IS 13115)

Type	CLASS A	CLASS B	CLASS C	CLASS D	Electrical	CLASS F	Comments
	Combustible materials (e.g. paper & wood)	Flammable liquids (e.g. paint & petrol)	Flammable gases (e.g. butane and methane)	Flammable metals (e.g. lithium & potassium)	Electrical equipment (e.g. computers & generators)	Deep fat fryers (e.g. chip pans)	
Water	✓	✗	✗	✗	✗	✗	Do not use on liquid or electric fires
Foam	✓	✓	✗	✗	✗	✗	Not suited to domestic use
Dry Powder	✓	✓	✓	✓	✓	✗	Can be used safely up to 1000 volts
CO2	✗	✓	✗	✗	✓	✗	Safe on both high and low voltage
Wet Chemical	✓	✗	✗	✗	✗	✓	Use on extremely high temperatures

A first aid kit is a collection of supplies and equipment that is used to give medical treatment. There is a wide variation in the contents of first aid kits based on the knowledge and experience of those putting it together, the differing first aid requirements of the area where it may be used and variations in legislation or regulation in a given area.

Fire Extinguisher

A fire extinguisher is a equipment used to extinguish or control small fires and often used in emergency situations. Generally, a fire extinguisher has hand-held cylindrical pressure which is discharged to extinguish a fire.

Front Nozzle System

This system will be used to suppress the fire hurdles coming in front of the vehicle. This system can produce a jet of water up to 15 feet. This system comprises of a water storage tank, a piping system and a nozzle which are mounted on the leg guard. The water cylinder in the system can system as well as to extinguish the fire with the help of a hose This is basically a manually operated system which suppresses front fire automatically



Figure1.2: Arrangement of Nozzle System

Semi Fixed Hose Reel System

This hose reel system is mounted just above the rescue box. The inlet valve is kept open for the application of outer pump. Length of reel will be around 8m. Water mist technology nozzle will be used.



Figure1.3: Hose Reel Arrangement

Navigation System

It guides the shortest route to the destination. Software installed will provide data directly to the firefighter on his screen. It uses satellite information. Navigation system will be mounted on the just above the speedometer for a clear view of the guided destination. The navigation system can also be used for communication purposes in case of further requirements.

IV. RESULT

The bike construction is done under the standard for all the equipment. The equipment installed on the bike are workable in all the situation of emergency.

The bike used is very powerful to bear all the capable load than been installed as to move including the weight of the firefighter.

Fire Hose Reels are easy to use as they are directly connected to the water supply having length up to 15 m and 30 m.

DCP Extinguisher

The dry chemical powder extinguisher contains the high specification Purple K Powder for use in situations where high firefighting capability is required. This model is manufactured from high strength steel cylinders with a red epoxy polyester paint finish. Model 415 is supplied with a heavy-duty chrome plated brass valve and stainless-steel handles.

Capacity	9 kg
Fire rating	89B
Av. Charged Weight (kg)	18
Operating Pres. (psi/bar)	195/13.4
Range (meters)	5-7
Av. Discharge Time (secs)	16
Height (cm)	61
Media	Purple K powder

The bike contains a very good workmanship and finish the specification of the bike are as following.

Engine	150 cc
Color	Modified fire red (IS 5 Shade 536)
Weight of passenger and cargo	150 kg (approx.)
Fuel tank capacity	10litre

Calculation

Load distribution

Gross weight = (kerb weight) + (weight of passenger and cargo)

Kerb weight = 125kgs

Weight of passenger and cargo=150kgs

Weight of passenger and cargo:

Passenger weight =75kgs

Extinguisher weight = 60kgs

Tool box = 5kgs

Other =10kgs

Total = 150kgs

Gross weight = 125kgs + 150kgs
= 275 kgs

The gross vehicle weight will be around 275 kgs which include all weight present of the fire bike.

Fire extinguishing media

DCP = 2 cylinder of 9 kgs (fire rating 89B)

Areacovered = 2* 89 square feet (according to fire rating 21B)

=178 square feet

The area covered by the DCP cylinder is around 42 square feet according to the fire rating of the extinguisher.

Fire rating 89B means it is suitable to extinguish the fire of class B with the area covered are denoted by the numerical prefix denoting the area covered in square feet.

Water = 2 cylinder of 9liters (fire rating 21A)

Area covered = 2*21 square feet (according to fire rating 21A)

= 42square feet

The area covered by the water cylinder will be around 42 square feet according to fire rating of the extinguisher.

The rating 21 A denote suitable for A class of fire and 21 denote the water equivalency rating 1A is equivalent to 1.25 gallons of water.

V. CONCLUSION

Overall, the design and improvisation of Fire Fighting bike has been successfully done. All the action which has to be performed like fighting with fire in running vehicle condition, semi fixed Hose reel system, Navigation System and Extinguisher is working properly. Firefighting bike with these modifications will be a new success in terms of safety as well as firefighting and rescue operations. The problem for which the solution in the form of this project is given was to develop a small, portable and light multipurpose firefighting equipment which provides aid in rescue services

in small duration of time and even in the busiest of the city traffic to minimize, reduce and eliminate hazards that occur due to fire in places which are in confined areas and are also not accessible by larger and bulkier full sized fire tender. We by working on this project are trying to improve and develop solutions for such situations and emergencies.

It is will also set a future mark for the safety vehicle manufacturer as it will be capable to extinguish fire in running vehicle condition. As, a conclusion the project entitled ‘The design and improvisation of firefighting bike’ has achieved its aim and objectives successfully.

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