

THREE WHEELER VEHICLE WITH MULTIFUEL SI ENGINE

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Abstract: Generally we have many type of vehicles which are having unique fuel mechanism. Those are efficient in their perspectives. But specific fuel availability in different places is highly problematic for sometimes. And we can not use one type of fuel for other type of engine. So we have to make a hybrid engines to use different types of fuels for a single engine. Our project is based on this type of technology that can be used for different type's fuels. We used petrol and CNG as different types of fuels. And using dual fuels is a user friendly phenomena that we can get at least one type of fuel in different place. And this type of engines can provide higher mileages at low cost of fuels. We made this type of engine that can handle two types of fuels alternately. We used an S.I. engine for the making of malty fuelled engine. It can be operated with different types of fuels like petrol and CNG. And we got a good fuel efficiency for higher pay loads as compared to other single fuelled multi setter vehicles.

Key Words: Diesel, DT Si Engine, Hub, Chain sprocket

1.INTRODUCTION

The motorcycles sales in India have been growing in the past few years at double-digit rates, and recently surpassed one million vehicles a month mark. With annual sales five times that of passenger car sales, motorcycles continue to dominate the on-road passenger vehicle fleet and petrol consumption. These three wheelers play a critical role in providing point-to-point as well as feeder service in all urban and semi-urban areas. Given the importance of two and three Wheelers in improving personal mobility in India, careful attention must be paid to the possibility of reducing emissions and fuel consumption from these vehicles.

It also includes a review of the possible technical options that may be available over the coming decade to reduce fuel consumption of two and three wheelers such as improved engines and other sub-systems, control system optimization etc., and an estimation of fuel consumption reductions possible through these technical options.

The report also examines the technical options to address important – and hitherto neglected areas of - durability requirements, cold start emissions, evaporative emissions, and on-board diagnostic systems along with an assessment of the cost impact of measures and the likely

Challenges for their introduction and effective implementation.

Finally, the report gives certain policy recommendations for improving the in-use vehicle testing and compliance program as also to improve fuel and lubricant quality to enable further reductions in emissions and fuel consumption of two and three-wheelers

1.1 Parts of three wheeler vehicle.

- Steering
- Battery
- Chains sprocket
- Charging coils
- Engine
- Gas kit
- Wheels
- Axel rod

1.2 STEERING SYSTEM:

Steering wheels are used in most modern land vehicles, including all mass-production automobiles, as well as busses, light and heavy trucks, and tractors. This can be through direct mechanical contact as in recirculating ball or rack and pinion steering gears, without or with the assistance of hydraulic power steering, HPS, or as in some modern production cars with the assistance of computer controlled motors, known as Electric Power Steering.



Steering

1.3 BATTERY:

Part Number: PSB 9LB

Product Line: NAPA Power Sport Batteries

Attributes:

Amp Rating : 9 Ah @ 10 Hrs

Battery Dimensions : 5 5/16" L x 3" W x 5 1/2" H (135 mm x 75 mm x 139 mm)

Battery Voltage : 12 V olts DC

Features and Benefits: High Performance Series Uses Special Lead Alloy To Reduce Self Discharge & Maximize Starting Power, Uses Active Material Compound Designed To Resist Vibration & Has Most Advanced Technological Battery Construction Methods



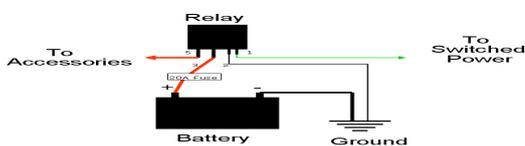
Battery

We know your bike is your pride and joy. And you ensure that only the best goes into it. We ensure that only the best goes into our batteries as well. That's why rely knowledgeable riders like you insist on Amaron.

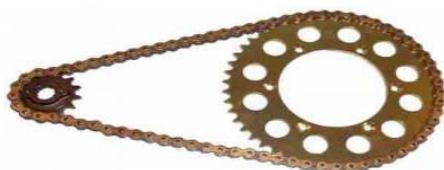
2.0 FEATURES AND BENEFITS PD

Features and Benefits: High Performance Series Uses Special Lead Alloy To Reduce Self Discharge & Maximize Starting Power, Uses Active Material Compound Designed To Resist Vibration & Has Most Advanced Technological Battery Construction Methods High efficiency

- JIS Standard Lead Acid batteries – 32 Ah to 200 Ah
- DIN Standard Lead Acid Batteries – 42 Ah to 105 Ah
- Maintenance Free Batteries – 35 Ah to 200 Ah
- Envelop AGM separators.
- Durable performance
- Easy to use and install



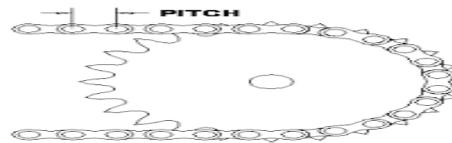
2.1 Chain sprocket



Chain sprocket

Have you ever wanted to change a sprocket on your motorcycle to change the performance but didn't know how to calculate the formulas? Well look no further the guys over at Gearing Commander have created an online tool which allows you to calculate the different sprocket sizes according to your particular motorcycle model. What a great tool for trying to figure out what sprocket you may need for different tracks or just want to change the acceleration off the line

2.2 Roller Chain



chain is manufactured to precision standards utilizing world-class technology. The designed-in, built-in quality and manufacturing methods produce Morse brand chains with high horsepower ratings. This allows designs benefiting from a higher service factor and obtaining longer chain/ drive life with reduced maintenance. The quality features of standard roller chain include:

- wide wasted links
- solid rollers
- quad staked rivets

2.3 Roller Chain Sprockets

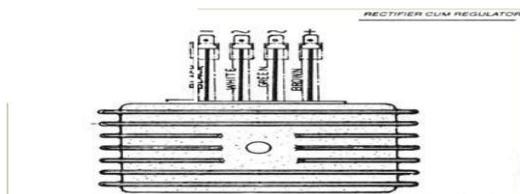
- Choose from the world's largest selection of high-quality, shaft ready sprockets to solve all your application needs. Browning® offers hardened sprockets that last longer than unhardened ones. The result is increased chain life and reduced downtime BROWNING SPLIT TAPER® Bushing — available in inch and metric sizes: bore range 1/4-10".
- Q-D® Bushing in 1/16 inch increments and metric sizes.



2.4 Charging coils



2.5 Regulator-Rectifier unit



The alternator which consists of stator and rotor has three pairs of series connected coils. The alternator output is directly connected to regulator rectifier AC input terminals. Unit monitors the battery voltage and regulates the charging current to the battery according to pre-set regulating range (Range : old : 13.8 volts to 14.6 volts. New : maximum of 15.5 volts)

2.6 DTSi Engine: DTSi stands for Digital Twin Spark Ignition, a Bajaj Auto trademark. Bajaj Auto holds an Indian patent for the DTSi technology. [citation needed] The Alfa Romeo Twin-Spark engines, the BMW F650 Funder which was sold in India from 1995 to 1997 also had a twin-spark plug technology, and the Rot ax motorcycle engines, more recently Honda's iDSI



3.0 INTRUCTION OF CARBURETOR



A combination of technology and engineering, Bajaj Pulsar 150 cc offers enhanced features like Digital Twin Ignition Technology (DTS-i) based engine, digital console, ride feel and chassis.

Looks

- Three colors - black, red & silver

- Smashing looks
- Mean muscular aerodynamic design
- Digital speedometers

3.1 FEATURES AND SPECIFICATIONS OF ENGINE

- Dimensions

Length	1990 mm
Width	750 mm
Height	1035 - mm

- Engine

Engine Type	4-Stroke SingleCylinder AirCooled
Displacement	150 cc
Maximum Power	14.09@8500 BHP@RPM
Maximum Torque	12.76@6500 Nm@rpm
Bore	57 mm
Stroke	56.4 mm
Compression Ratio	9.5:1
Starting	Self Start Kick Start
MaxSpeed	109.1 kmph
Ignition	CDI

- Acceleration

0-60 kmph	5.66 sec
Carburetor	CV Carburetor

- Transmission

Gear box	4-Speed
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- Chassis

- Suspension

Front Suspension	Telescopic Fork
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- Brakes

Brakes Front	Drum
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Brakes Rear	--
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▪ Tire Size

Front	2.75 x 17
Rear	100/90 x 17

▪ Electricals

Battery	12 V 0.0 Ah
Head Lamp	D.N.A
Tail/Stop Lamp	D.N.A

▪ Fuel

Fuel Type	Petrol & gas
Fuel Capacity	2 litre
Fuel Reserve	1 litre
Fuel Reserve	1 litre

4.0 GAS KIT AND PETROL SYSTEM

- The oil drain period of car running on Auto LPG will increase and it will also extend the life of spark plug as Auto LPG is a clean fuel.
- Adulteration or spilling or theft is not possible LPG reaches the engine in pure form resulting in an improved air / fuel mixture and enables refined combustion.
- There is hardly any discharge of co(Carbon mono - oxide) as compared to petrol and diesel since the exhaust fumes contains less harmful substance.

The CO emissions are around 80% less than petrol and 40 % less than diesel. Hydrocarbon emissions are 60 % less than petrol and 50 % less than diesel. Nitrous Oxide emissions are around 80 % less than petrol and 90 % less than diesel.

4.1 Gas & petrol can work in the same engine:



LPG like CNG can be used in bi-fuel mode for which selector switch is erected on dashboard, to activate Solenoid valve of either MS or LPG.

4.2 Low Pressure Knocker Gas fire



All knocker gas system works on low-pressure systems i.e., Gas cylinder by design, supplies gas fuel at a pressure as low as 0.5 PSI.

KLOCKNER Gassifire is a single stage suction based, twin diaphragm operated precision gas to gas control valve, specially designed to run air cooled single cylinder engines 50 cc to 375 cc 4 stroke as well 2 stroke

4.3 WHEELS OF VEHICLE



4.4 Hub

A hub is the center part of a bicycle wheel. It consists of an axle, bearings and a hub shell. The hub shell typically has two machined metal flanges to which spokes can be attached. Hub shells can be one-piece with press-in cartridge or free bearings or, in the case of older designs, the flanges may be affixed to a separate hub shell.



Hub brakes

Some hubs have attachments for disc brakes or form an integral part of drum brakes.



Hub Brakes

Rear wheel of 1960s Bootie Folding Cycle with Stormy-Archer drum brake

- Disc brakes - a disc brake comprises circular plate or disc attached to the hub which is squeezed between brake pads mounted within a caliper that is fixed to one side of the wheel forks. The brake disc can be attached in a variety of ways using bolts or a central locking ring.
- Drum brakes - a drum brake has two brake shoes that expand out into the inside of the hub shell. Rear mounted drum brakes are often used on tandems to supplement the rear rim brake and give additional stopping power.
- Coaster brake - coaster brakes are a particular type of drum brake which is actuated by a backward pressure applied to the pedals. The mechanism is contained inside the bicycle wheel hub shell.

For information on other types of bicycle brakes see the full article on [bicycle brake systems](#)

5.0 REVIEW OF POTENTIAL TECHNOLOGIES FUEL INJECTION

A precise control of the air-fuel ratio, a good mixture preparation and complete combustion of the fuel are the basic requirements for improved engine performance, reduced emissions and superior fuel efficiency. Historically the air-fuel mixture management of all types of spark-ignited engines - cars as well as motorcycles - was done using the carburetor. However, the need to bring about significant reduction in emissions brought with it the need for a more precise air-fuel mixture control that the conventional carburetor could not provide. This led to the development of the throttle body injection (TBI) with a single injector, which was followed by the superior Multi Point Fuel Injection (MPFI) system using a separate injector for each cylinder. The advent of fuel injection brought with it the electronically controlled engine management system also opening up avenues for more precise control of several engine parameters.

5.1 BATTERY ELECTRIC THREE-WHEELERS

Several efforts have been made to develop battery electric auto-rickshaws. Notable progress was made by Bajaj Auto to develop an auto-rickshaw using state-of-the-art drive unit technology. The vehicle used an axial flux permanent magnet brushless DC motor and controller to obtain superior system efficiency (GTZ 2009). The prototypes ran on lead acid batteries. The plan to produce this vehicle in larger number seems to have been shelved. Earlier efforts to develop electric three-wheelers by Mahindra have also met the same fate. It is normally believed that electric vehicles using conventional technologies are not expected to have widespread applications

in developing countries in South and South East Asia. The Chinese two-wheeled battery electric vehicles are an exception

5.2 Single front wheel 3-Wheelers:

Second component layout: 3-Wheelers with a single front wheel, coming from a regular 2-Wheel motorcycle. The rear may come from an old Volkswagen Beetle, or may simply be a modified motorcycle rear end:



Single front wheel Three wheeler

This group includes the off-road 3-Wheelers that are not sold anymore because of their rollover propensity. These single front wheel 3-Wheelers have lost popularity first precisely because they would easily rollover when turning, as on the right picture above. Also when braking while going straight, the weight is transferred to only one front wheel instead of two, in the case of the 3-Wheelers with two front wheels:

5.3 Leaning 3-Wheelers:

Fourth component layout: 3-Wheelers which include parts that lean sideways in curves in order to avoid the rollover problem presented by many 3-Wheelers. Lots of such 3-Wheelers incorporating different leaning systems have been developed. Among them, there were the Gm Lean Machine and the Mother Earth 3VG:

In all these cases, an additional mechanism was added that increased the complexity and weight of the vehicle to resolve the rollover problem.

5.4 Conventional Motorcycle with Side-Car:

Regular side-car for the road:

Many persons cannot imagine life without a side-car:

If you must carry a third person, like a child for a couple that loves riding, the component layout with a side-car can be a solution. And if a city police has a motorcycle, adding a side-car lets a policeman ride even during winter on the snow, as long as it's at slow speeds like during a parade. motorcycle that stays upright because of its side-car, the centrifugal force generates a transverse reaction (along the green arrow) at the

front tire contact patch on the ground, at a distance from the Front fork axis.

Stability: Our new 3-Wheeler is not more stable than a car. It's simply just as stable as a car in normal use. In reality, the point is not to compare our new 3-Wheeler to cars, but rather to regular 2-Wheel motorcycles. It's in fact within the motorcycle market that this 3-Wheeler will have to compete and present strong advantages.

5.6 Compared to these motorcycles, things are a lot different:

This problem does not exist because in a curve while accelerating, there is a weight transfer from the front wheel interior to the curve, to the other front wheel exterior to the curve. So this weight transfer limits the weight on the interior front wheel which drives the vehicle, in the case of our component layout. This limits the ground traction available from this interior front wheel, which limits at the same time the traction available from the exterior front wheel, because of the differential.

It's like when a car driving wheel is on the ice while the other driving wheel is on the asphalt, during winter. The wheel on the ice skids and has no ground traction, so that the other wheel cannot help move the vehicle either because of the differential. This finally limits the acceleration instead of increasing it as for the Scorpion and the T-Rex. This new and peculiar component layout thus limits the chances of overturning.

No falling at standstill:

Even with a rear passenger, fuel tank fully filled and all three luggage compartments fully loaded, the vehicle cannot fall because of its three wheels.

A rider is thus certain not to be left alone to get his heavy motorcycle back up. He's also sure he can go back to work Monday morning, without an ankle broken by his heavy touring motorcycle dropped at stand still.

No falling when braking hard:

On wet pavement or on ice patches at the beginning or end of the season, there's no danger of falling and slipping under the incoming traffic, like with a regular motorcycle. And with no risk of falling, the rider can use all of his braking power without fear of locking the front wheel and falling, like on a regular 2-Wheel motorcycle.

Stability at highway speeds:

The vehicle is very stable against side winds, because it's a front wheel drive with all the weight of its power train at the front, like an arrow head.

Light and powerful:

To grasp how this new 3-Wheeler can potentially be light and powerful, it's essential to understand why snowmobiles have their passengers sitting astride each other. A narrower vehicle can go through the woods more easily, but there is more to it:

As it is for 3-Wheelers, if the passengers sit one beside the other, the vehicle has to be quite large like an automobile. The vehicle is thus narrowed a lot if the passengers sit astride each other. The vehicle is like a beam supporting a load between its two supports, which are the wheels. So the larger and longer the vehicle is, the heavier the beam has to be in order to support its load. Physics books tell us that its own weight is proportional to the square of the length between its supports. So if the vehicle chassis can be either half its length or half its width, this chassis weight can be 4 times lighter.



Three wheeler vehicle

Neither the length nor the width can be reduced in half. But since the passengers sit astride each other and also astride the power train, the chassis weight can clearly be lighter.

Snowmobiles use this layout, so the vehicle chassis can be the lightest possible. It's the reason why snowmobiles and motorcycles are about four times lighter than small automobiles. And it's precisely because of this passenger layout that the first snowmobiles were able to float on the snow.

Our new 3-Wheel concept also uses this passenger layout, which lets it be the lightest possible non-falling motorcycle. Moreover, it can be equipped with powerful motorcycle or snowmobile engines (over 150hp).

One could think that with its third wheel adding extra weight, this 3-Wheeler could not offer a Power-to-Weight ratio as high as for a sports motorcycle. But in reality, this 3-Wheeler does not fall and does not have to be held up at standstill. It can thus be equipped with even more powerful engines as for regular motorcycles, in order to offer an equal or even higher Power-to-Weight ratio..It can't all be that good! Where's the hidden bug:

A) Not the best accelerations:

In forward acceleration, weight is transferred to the rear. This adds weight to the rear wheels of a rear drive vehicle, to let the rear wheels push more in order to accelerate faster. But this removes weight from the front wheels of a front drive vehicle, which limits its forward accelerations. Its the reason why almost all vehicle racing at a 1/4 mile drag strip are rear drive vehicles. Its the reason why Formula 1 cars, Ferraris and Corvettes are rear drive vehicles.

B) No rear brake:

Our new 3-Wheeler is a front drive vehicle. So like for a front drive car, a sudden application of the rear brake can block it and cause a spin. This 3-Wheeler should thus be equipped with excellent front brakes and rear brakes should be avoided.

In the case of such a 3-Wheeler that's loaded correctly and that's braking hard, weight is transferred to the front so that the front wheels brake hard and well, while the rear wheel keeps the direction like a car or plane rudder.

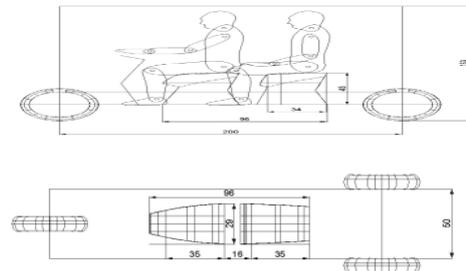
C) Traveling on the snow:

Our new 3-Wheeler has 75% of its weight on the front driving wheels, compared to 40% for rear-drive cars like the Mercedes and Corvettes, and 60% for front-drive cars. So this 3-Wheeler has an excellent potential for good traction in the snow. Moreover, the rider can stand up and lean forward to increase the weight on these front driving wheels, and gain even more traction. Also, if he gets stuck in the snow, he can get up and jump on the seat to press down the snow under his vehicle. If it's not enough, he can get off and easily removed the snow under his vehicle which is narrower than a car. He can then push on the handlebar while actuating the accelerator that's on the handlebar, like it's done with snow mobiles. He can finally simply lift the rear and turn 180 degrees backwards to return where he came from, just like it's done with a snowmobile except that the rear end is lighter since there is no track underneath. On the other hand, this excellent snow-traveling capability is not mentioned in the advantages of our new 3-Wheeler.

The reason is simple: During winter in northern regions, roads are often covered with slush: A mixture of dirty snow, sand, road salt and unfrozen water, often about 100 mille meter thick. As soon as our 3-Wheeler will pass another incoming car, its passengers will be covered with this slush mixture. So there's no possible comparison with the pleasure of going through a white snow immensity on a snowmobile. Furthermore, there is the added risk of a spin when hitting a road side snow bank, as described below.

Ergonomics

Seating position alert type Vehicle seat dimensions by referring to Indian anthropometric data



Manufacturing of vehicle

6.0 CALUCULATION OF PETROL & GAS

Engine:	4 stock (petrol & gas)
Displacement	150cc
BHP	15.2/8500
Torque	13.7/7000
Transmission	4 gears
Mileage for petrol	35-45 KMPL approx
Mileage for gas	60-70KMPL approx
Steering :	Direct steering
Brakes :	Front brake
Wheels :	14 inch alloys
Tyres :	3.00-14 Zapper M (MRF)

- PETROL this vehicle gives 30km mileage per a liter of petrol 1lit = 30km
- FOR GAS ; 1kg=60km

6.1 ADVANTAGES

- Efficiency is high
- Cost is low
- No pollution
- Sound pollution is less
- Multi fuel for petrol and gas

6.2 Conclusion:

We made this type of engine that can handle two types of fuels alternately. We used an S.I. Engine for the making of malty fuelled engine. It can be operated with different types of fuels like PETROL and CNG. And we got a good fuel efficiency for higher pay loads as compared to other single fuelled multi seater vehicle