Turbo Charger in Two Wheelers

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***Abstract*-Effect, design and installation of turbo charger in SI engine are available in this paper. Turbo charger in two wheelers is used to increase the efficiency of engine. Supercharger works on engine power while turbo charger works on exhaust gases. Turbochargers are used throughout the automotive industry as they can enhance the output of an internal combustion (IC) engine without the need to increase its cylinder capacity. The emphasis today is to provide a feasible engineering solution to manufacturing economics and "greener" road vehicles. It is because of these reasons that turbochargers are now becoming more and more popular in automobile applications. Small modification is done on vehicle to improve efficiency and also control the exhaust gas emission level. The aim of this project is to increase to volumetric efficiency and also control the emission level of "TWO WHEELERS".**

WORKING PRINCIPLE

A turbocharger is basically an air pump. Hot exhaust gases leaving the engine after combustion are routed directly to the turbine wheel side of the turbocharger to make it rotate. That turbine wheel is connected by a shaft to a compressor wheel. As the turbine wheel spins faster and faster, it causes the compressor wheel to also spin quickly. The rotation of the compressor wheel pulls in ambient air and compresses it before pumping it into the engine's chambers.

The objective of a turbocharger is the same as that of a supercharger, to improve an engine's volumetric efficiency by solving one of its cardinal limitations.

TURBO CHARGER DESIGN

A naturally aspirated automobile engine relies mostly on the downward stroke of a piston to create an area of low pressure in order to draw air into the cylinder through one or more intake valves. The pressure in the atmosphere is no more than 1 atm (approximately 14.7 psi, or 1 bar), so there ultimately will be a limit to the pressure difference across the intake valves and thus the amount of airflow entering the chamber. Since the turbocharger increases the pressure at the point where air is entering the cylinder, a greater mass of air (oxygen) will be forced in as the inlet manifold pressure increases. The presence of additional air mass in the cylinder makes it possible to create a bigger explosion if more fuel is injected, increasing the power and torque output of the engine.

DESIGN OF TURBINE FAN

The outer radius of fan is 50mm

The fan is made in such a way that it has 6 wing of dimension [6 ×4.5] When the gas flowing through the fan, the fans tins it most rotates faster.

ASSUMPTIONS

- The weight of the fan is 70 grams.
- The air traction has min. force is 0 .
- The force exerted by silencer is uniform.
- There is no bearing resistance considered in fan motion.
- There is no thermal expansion considered.

DESIGN OF SHAFT

The shaft is designed in such a way that the shaft should not fail in high speed.

SELECTION OF MATERIAL

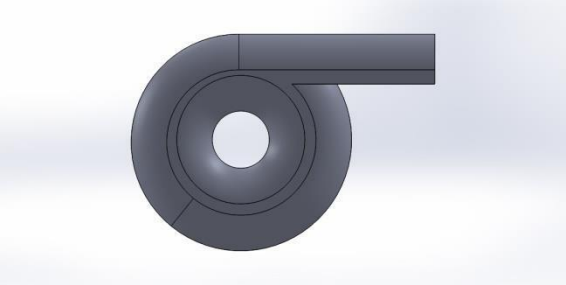
M.S. Fatigue strength = 40 N/mm.

The shaft is designed in such way to avoid failure plus the M.S is a good conductor of heat. The fatigue strength of MS is good as compared to other materials.

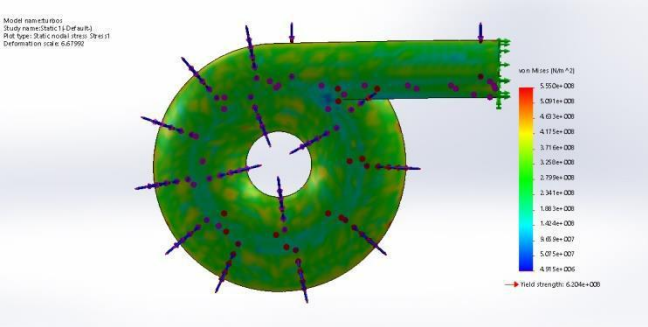
ASSUMPTIONS

- The torque transmitted power of one KN, as there is no force expects air.
- The thermal expansion is not considered.
- The bearing failure is not considered.
- The crushing failure of shaft at bearing is not considered.
- The pitch of a screw are at inch and done by trial and error method.

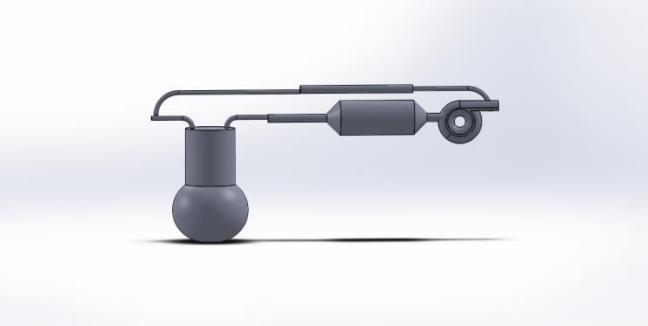
DESIGN OF TURBOCHARGER



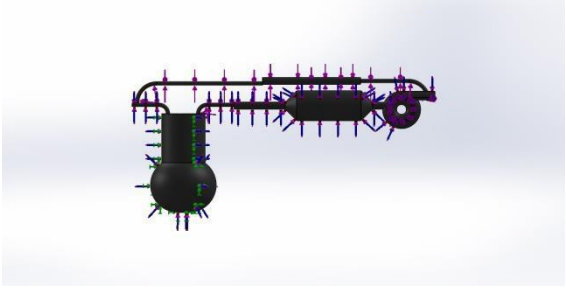
ANALYSIS OF TURBO CHARGER



DESIGN OF TURBO WITH ENGINE



ANALYSIS OF TURBO WITH ENGINE



EXPERIMENTAL RESULT(WITHOUT TURBO)

S.no.	Fuel	Trail	Kilometre driven	Avg.
1	100	1	5.1	5.35
		2	5.6	
2	250	1	13.8	13.95
		2	14.1	
3	500	1	29.7	31.35
		2	33	

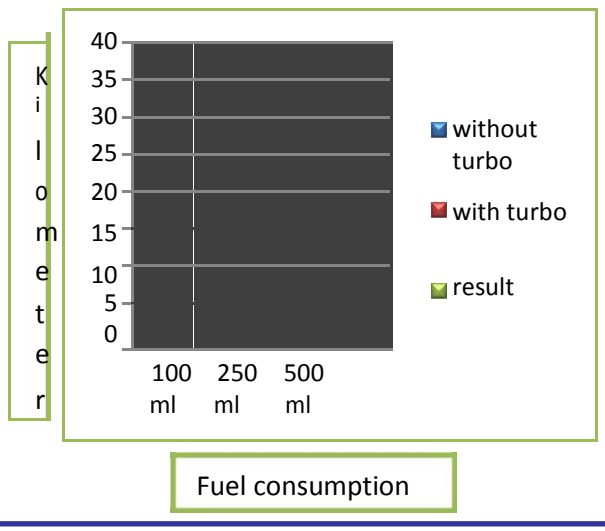
EXPERIMENTAL RESULT(WITH TURBO)

s.no.	Fuel (ml)	Trail	Kilometres driven	Avg.
1	100	1	5.7	5.9
		2	5.9	
2	250	1	14.6	15
		2	15.4	
3	500	1	32.3	33.95
		2	35.6	

COMPARISION OF RESULT

S.No.	Avg. (without turbo)	Avg. (with turbo)	Increase in Mileage
1	5.35	5.9	0.55
2	13.95	15	1.05
3	31.35	33.95	2.6

RESULT GRAPH



COST ESTIMATION

S.No.	Materials	Quantity	Cost in Rs.
1	Bike	1 x 4000	4000
2	Bearing	2 x 220	440
3	Shaft	1 x 45	45
4	Turbo charger housing	1x1900	1900
5	Compressor fan	1 x 1000	1000
6	Turbine fan	1 x 1000	1000
7	Air filter	1 x 350rs	350
8	Nuts & Bolts	4 x 5rs	20
		Total	8755

SCOPE OF THE PROJECT

- Turbocharging is the most affordable "green" technology available today, as it increases fuel efficiency through engine downsizing without compromising performance and the thrill to drive.
- By way of illustration, a turbo fitted to a small engine equals the power of a large engine combined with the fuel efficiency and improved emissions of a small engine.
- Delivering up to 20% better fuel economy in vehicles with gasoline engines, and up to 40% fuel savings on diesel engines, turbochargers have become the choice for many automobile industries.

CONCLUSION

According to industry research, global turbo penetration is expected to reach more than 70% during the next 10 years. By contrast, electric vehicles are likely to remain below 10% for the same period. The global turbo industry is expected to grow at an annual rate of 10% a year in the next five years, from 22 million turbocharged vehicles today to 35 million in 2015. Europe will continue to be the leading region in terms of turbocharger adoption across light and commercial vehicles, exceeding 70% penetration by 2015. In North America, a key automotive market with one of the lowest penetrations of turbochargers, turbo use will double to 20%, up from a projected 11% today. China will also see its turbo market grow from 11% in 2010 to 25% in 2015. To accompany this trend, Honeywell will debut more than 100 new turbo engine applications this year alone on passenger and commercial vehicles across the globe and has 500 in total in its development pipeline. *Honeywell Turbo Technologies is the world's leading automotive turbocharger developer, supplying technology solutions to nearly every major vehicle manufacturer worldwide. The Turbo Technologies business is part of Honeywell Transportation Systems, which enhances vehicle performance, efficiency and appearance through state-of-the-art technologies, world-class brands, and global solutions tailored to the needs of its automotive customers around the world.*

PHOTOGRAPHY

TURBO CHARGER VIEW 1

TURBO CHARGER VIEW 2

PHOTOGRAPHY OF COMPLETE PROJECT

PHOTOGRAPHY OF TURBO IN TWO WHEELER

REFERENCE

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