



Small diesel engine for motorbike⁷⁰

CONSOLATION

Mansukhbhai Sanchaniya Suthar, (60) hails from Atkot village, Rajkot District, Gujarat. He has studied upto the fifth standard. He owns a service centre for automobiles, named "Ravi Auto Diesel Services" and has about 40 years of experience in repairing diesel and petrol engines. For 15 to 16 years he was a carpenter, after that he became a lathe operator and worked for a few years in "Jagat Diesel Engineering" at Atkot which made 5.68HP diesel engines. After getting a lot of experience from the same shop, Mansukhbhai purchased a lathe and some other machinery and in 1972, he started his own workshop, Vishwakarma Mechanical Works. Initially he manufactured threshers, pumps for lifting water and repaired diesel engines and other machinery useful for rural livelihood. But because of his financial situation and the market competition, he shut his manufacturing unit and started this automobile workshop in 1982, which is now his main source of income. His two elder sons are helping him with the workshop while the youngest son is a painter.

Address

Ravi Auto Diesel Services
Kailashnagar, Rajkot –
Bhabnagar Highway
Vill.- Atkot, Ta- Jasdan
Dist- Rajkot, Gujarat

Scouted by

Jivrajbhai



Genesis Eight years back Field Marshal Company brought a diesel engine from Germany and displayed it at an exhibition held in Rajkot. Mansukhbhai went to see the engine and got a chance to talk with the chief engineer of the Field Marshal Company. Mansukhbhai asked whether the size of the machine could be reduced. The chief engineer told him that it was not possible. Then and there Mansukhbhai took it as a challenge to develop such an engine. In the process he faced a number of problems, the engine got heated up and even got burnt a number of times. He had to make changes in the material used as well as timing and grades of oil. Mansukhbhai remembers that people kept on saying that he was wasting his time, but he kept focusing on his work, ignoring what people said. Finally he made his dream come true by developing a 3.5HP diesel engine. He spent almost 4.5 lakhs on building the first prototype in four years. But he asserts that the present

design of the modified engine can be produced within Rs.12, 000. Mansukhbhai has not sold any engine commercially till date.

He has received a Sammanpatra from SRISTI in 2003 for this innovation. It has also been featured in three newspapers Ruttan Prabha, Gunnargartan and Vishwakarma vishwa. NIF has sanctioned him Rs.31, 375 from the Micro Venture Innovation Fund for prototype development and testing of the innovation.

The Innovation

Mansukhbhai has developed a four-stroke compression-ignition diesel engine with a swept volume of 205 cubic cm which is capable of developing a brake horse power of 3.5 at 4500 rpm. Almost all the main parts of this engine are made of aluminum while in the conventional one they are made of cast iron. As

thermal conductivity of aluminum is quite high, it helps in quick transferring of heat. The size of the flywheel has been increased and this contributes to increasing the speed of the engine. The dimension of plunger has been decreased from 6 mm to 5 mm so the compression of the fuel is better and fuel is converted into fine form more quickly. The dimension of the plunger guide is changed so the number of gears required is reduced. The dimension of the crank rod has been reduced leading to a reduction in stroke length and increase in speed. In the conventional diesel engine, there is bushing (which needs lubrication to counter wear and tear) in the piston, while in this one the innovator has used bearing. The diameter of the injector and the number of holes on the injector is less compared to the conventional one and hence injection is at higher pressure and this helps in better ignition. Diesel is converted into spray more quickly as the dimension of the nozzle is reduced. The injection system i.e. fuel and compressed air injection system are at right angles to the engine body, so it takes around five minutes to fit it, while in the conventional one it takes about one hour.

The innovator has also developed a 7.5 HP diesel engine weighing 35 kg.

Advantages

The main feature of this innovative engine is its compact size which is almost half of the conventional diesel engines of similar ratings. It is also one third the weight of the conventional diesel engines and weighs only 24 kg as major components such as engine block; cylinder head etc, are made of special aluminum alloy. It has a

high strength to weight ratio which is essential for mobile applications. The engine has an improved cooling system wherein the sizing of the fins and orientation of the engine block in the vehicle frame ensures optimum dissipation of excess heat to keep the engine running efficiently. The quantity of lubricant used is only 600 gm as compared to two litres used in the conventional one. The design requires less maintenance and repair. When mounted on a motorcycle (Rajdoot brand) used in rural areas, a mileage of 100km/litre and speed of 55 km/hour was achieved along with a pillion rider. Due to its small size and light weight construction, it can be used in two wheelers and for various other applications such as pumps, mini-flour mills, lawn mowers, motor-boats, small elevators, portable power generation sets etc.

Moving forward

Mansukhbhai has a very good reputation among diesel engine manufacturers and has been called by many top level engine manufacturers (like P M Diesels Ltd) to solve the problems of their company in the area of R & D in engine technology. Now he is planning to develop an engine that can be run using any fuel like petrol, diesel and gas. He also has an idea for making a two-piston tractor. Mansukhbhai had also earlier developed a lathe machine for diamonds, a groundnut separator and a drilling machine. He attributes his interest in innovations to the influence of his mother, who was always making toys from waste clothes, with new designs etc. Even at the age of 60, he travels to Rajkot frequently, is active on the lathe machine in his own workshop and is ready to take up challenges for any development in the engineering area.