

## DESIGN OF A SLINKY FAN

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### ABSTRACT

*This report is a short description of my project carried out as compulsory component of the M tech the project is carried out at the Bosch Pvt Ltd. Since I am interested in research work, the work was concentrated on the department of research and development different type's automotive components are designed.*

*My project is design of slinky fan which is present inside the alternator also called as generator it contains many important components in that cooling fan is important component as my project is the design of the new fan whose manufacturing process and the model.*

*The dimension and other parameters are same according to the alternator so it fulfils the overall parameters of the generator.*

*For design of the this model I worked with NX 8.5 and 9 the design of this fan is completely now as the manufacturing point if view cost saving and time reducing in this project theoretically or nearly 3000 mm sq material is saved and this project may be claimed for the patent.*

**Key Words:** Design, Concept generation, Alternator, Noise

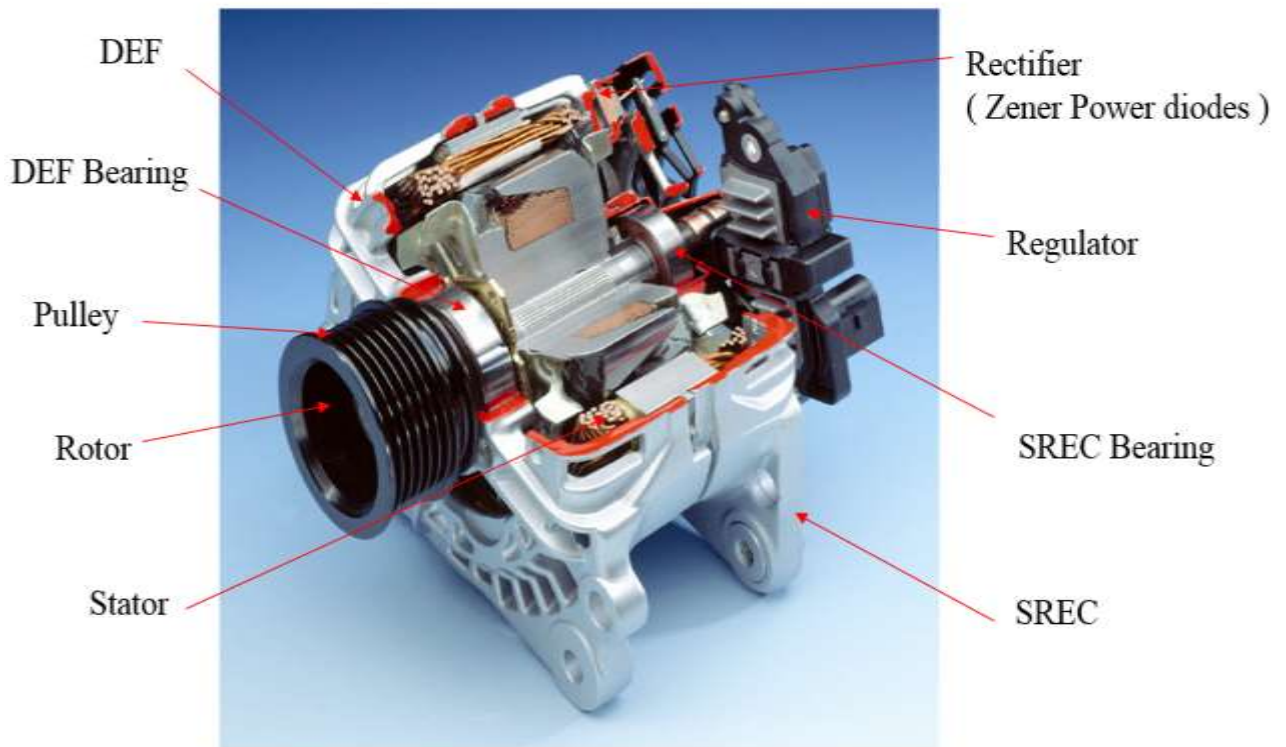
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### 1. INTRODUCTION

In order to supply the power needed for the starter motor for ignition and fuel injection systems, for the ECUs to control the electric power required for the lighting and for safety and convenience electronics, motor vehicles all these need an alternator to act as their own efficient and highly reliable source for energy which must always available, at any time may be day or night.

Whereas when the engine is stopped, the battery is the vehicle main energy store the alternator is now the on-board "electricity generating plant" when the engine is on its task is to supply energy to all the vehicle's current consuming loads and systems in order that the whole system is reliable and no trouble for operation its necessary that the output of the alternator capacity of the battery and requirements of the starter motor together with all other electrical loads are matched to each other to be optimally as possible.

An Alternator which converts mechanical rotational energy into electrical energy, is an important component of a vehicle. Alternators operate over a wide broad range of rotational speeds, typically from 3,000 RPM to 18,000 RPM, which demands a cooling fan producing sufficient air flow, ideally with a minimum of noise. In the current study, an optimized alternator cooling fans was developed through a linked DOE (Design of Experiments) process and numerical analysis



**3. Rotor Exploded View**

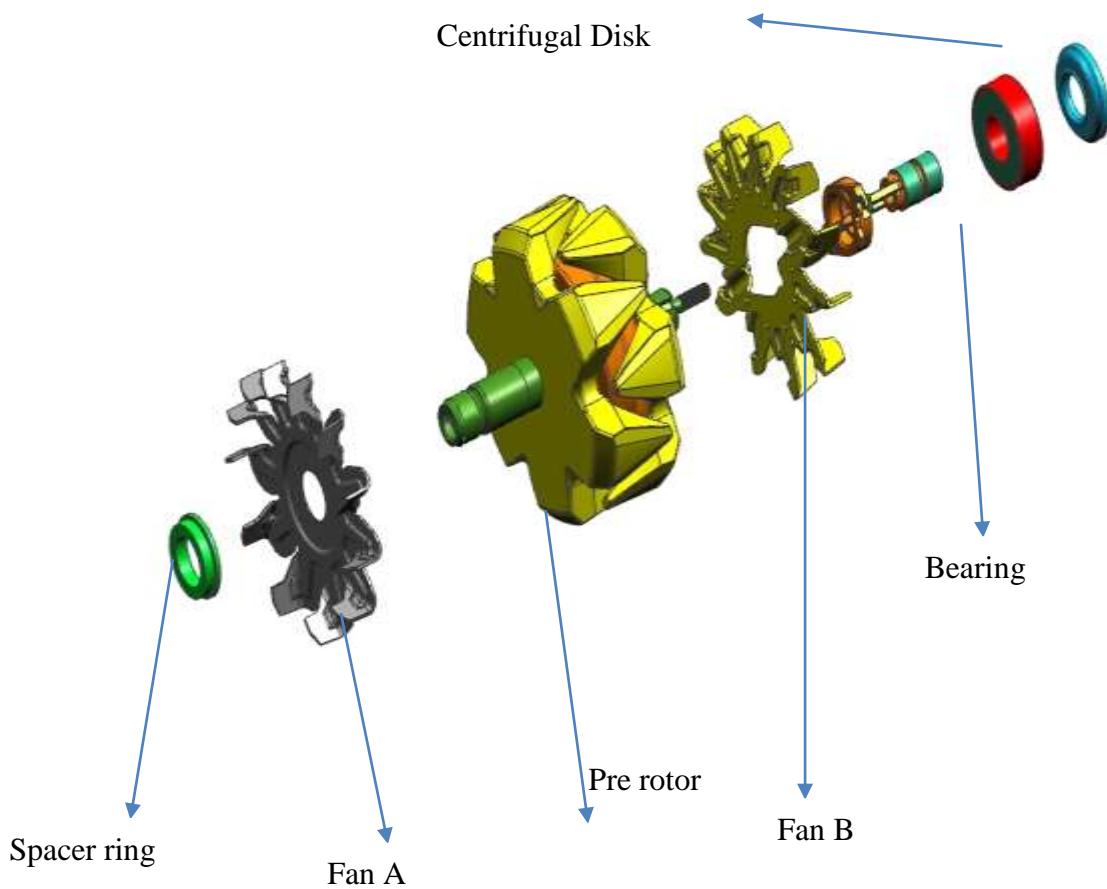


Fig: 1.5 Rotor Exploded View

The above exploded view illustrates the main components that constitute a rotor design the system consists of (a) The rotating prerotor with claw pole and shaft (b) The Fan A and Fan B (c) The Fan A is press fit with the spacer ring to the shaft and fan only support is the spacer ring above the spacer ring the bearing is fitted to which the stator and other DEF assembly is made to assemble as rotor assembly is the sub assembly of an alternator assembly as shown in the fig 1.4

#### **4. Objective**

Manufacturing process of the Fan is lengthier and time consuming most material is wasted. It is important to know the insight of the Rotor and Fan material and also the manufacturing process of the components to predict the life of the working components. Two Fans with different manufacturing process is taken into account; one in which the Existing and other the newly designed slinky fan manufactured from rectangular strip and the other existing one through punching and blanking operation.

Owing to these reasons, the current work was taken up with the following objectives.

- 1 To understand the concept of automotive alternator.
- 2 Calculate theoretically the weight and scrap of the component before manufacturing
- 3 Design change of the rotor for the new integrated claw pole fan assembly.
- 4 To suggest the optimum manufacturing process for less Noise, Vibration and Harshness.

#### **5. Conclusions**

1. The spacer ring is eliminated it saves the more material and spacer ring costs 20
2. The fan is welded to the claw pole so at the circular end of the fan it is held tightly
3. The contact area is more between the fan and the claw pole
4. The vibration between the Fan and the claw pole is reduced
5. Due to the increased contact area the noise and harshness is reduced.

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