

# Enhancement of Atomization In Spray By Using Two-Speed Gearbox For Agriculture

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**Abstract-** The agricultural productivity gives larger growth in India at larger rate. The productivity of sector depends upon many factors, one of the major factors is use of agricultural vehicle for farming where some activities are carried out by heavy duty vehicle in organization, in which spraying fertilizer by use of engine power of the vehicle is also a major part and there is need of a Gearbox which can complete that requirement. The main purpose of this assignment is to provide a secondary gear box with high increment ratio for supplementary equipment for agricultural vehicle, low weight and efficient for a Tractor engine up to 1000cc and 25hp. It should be capable of providing up to 4900rpm and should bear the forces of rotating blades which will be used for spraying pesticides and herbicides. The assignment being with study on gearbox, theoretical calculations, analysis, verification, assembly, testing, and at last final testing of the gearbox.

## I. INTRODUCTION

The main objective of our project is to create a gearbox with single inputs and a single output. For this purpose, we have selected one input shafts and one output shaft. It is a two-speed sliding mesh gear box, controlled by a dog clutch for the required sliding mechanism. It is simple, effective and a cost-efficient design. It is a hand feed gearbox. Adequate provisions have been given to adapt a motor or an engine to it. It is designed with utter care to withstand high loading and has a high factor of safety. The gearbox was fabricated with high accuracy milling machines and tools with good engineering practices.

## II. LITERATURE REVIEW

Maruti Patil, P Ramkumar, K Shankar (30/01/2019)

[1] Multi objective minimization of power loss and volume of a two-stage helical gearbox with additional novel tribological constraints was carried out. The results were compared with a single objective optimization with and without tribological constraints. The single objective problems minimize the volume only following the traditional approach in gear

optimization literature. The simulation was done for a variety of oils (ISD VG 68,150,360 and 580) and at 1000 and 1500 rpm with three different gear profiles.

Diego Cabrera Fernando Sancho Chuan Li Mariela CerradaRen'e-VinicioS'anchezFannia Pacheco Jos'e Valente de Oliveira (2016) [2] The case study is the identification of fault severity in helical gearboxes from a vibration signal, where the design and extraction of condition parameters is a non-trivial task when performed by the conventional classical methods. Moreover, the results obtained by the latter methods are hardly applicable to other 480 real-world systems as the features containing the most representative information are highly dependent on the specific mechanism.

F Elbarghathi, T Wang, D Zhen, F Gu and A Ball (2012) [3] CWT (Continuous Wavelet Transformation) has been shown to be an effective tool for rotating machinery fault detection and diagnosis. In this study, the fault diagnosis of a two-stage helical gearbox is carried out based on the CWT analysis and TSA techniques. TSA allows the noisy components to be removed significantly and hence highlights the fault related impulse components which paves the basis for accurate feature extraction. Moreover, three types of wavelets: db1, sym2 and coif3 were explored to find the optimal wavelet for separating the small fault. The results have shown that wavelet db1 produces the best fault separation whereas the coif3 wavelet fails to do the separation. It means that different wavelets produce different separation results.

## III. METHODOLOG

So, in the view of above objective methodology of current research objective will be outlined as shown in flowchart below

### 1. Idea Generation -

This is a preparatory phase which involves the review of the literature and theoretical study of Design and

Development of 2-speed Gear box. The purpose of this project is for mass production and cost reduction.

## 2. Product Specification -

The basic aim behind the development of gear box is for reduce mass production and cost reduction . This phase includes selection of material , collecting information about required components and actual working of system

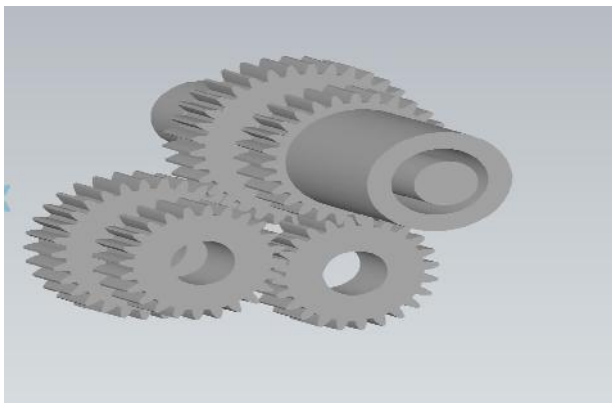
## 3. Feasibility study –

Here we analysis and evaluation of a proposed project to determine if it

- (1) is technically feasible,
- (2) is feasible within the estimated cost, and
- (3) will be profitable

## 4. Design (3D Model)

It will start with the design criteria's for individual system component. This includes design of shaft, Gears, and other system components. Also, it includes selection of proper elements for easy and fast response. We are designing 3D model with the help of 2D and 3D software like AUTO-CAD, Solid-Works, CATIA



**Fig no 1. 3D Model**

## 5. Failure Analysis-

Failure analysis is the process of collecting and analysing data to determine the cause of a failure, often with the goal of determining corrective actions or liability. Here we are analysis the gear and shaft by analysis software like ANYSIS

## 6. Process Design -

Process design is concerned with the overall sequence of operations required to achieve the product specifications. It specifies the type of work stations that are to be used, by using specification which are obtained from the previous phase actual manufacturing of individual component will be done

## 7. Assembly –

After manufacturing of the component assembly of that part is done so that whole experiment setup will be done so that the whole experimental setup will be used for its technical evaluation.

## 8. Testing-

The experimental test were conducted to check the actual performance of setup the working of all components like gears, shafts and other components to make a statement about good working condition of setup.

## 9. Launch -

After successful testing of all the component during working and by evaluating there all parameter we are launching that product to the market

## IV. CONCLUSION

Today's Gearboxes in All Terrain Vehicles occupy more space, heavy and have limited life based on the operation. Operating these Gearboxes for continuously will produce heat that may affect the structural integrity. The high-speed gear box designed to be coupled with engine PTO that can vary the transmission ratios. Increase RPM from Engine PTO to Fan Out-put. Based on the analytical calculations and Finite Element Analysis we can conclude that all the components are not bound to failure within the given working parameters. The Gearbox is lightweight, compact and has increased life over the conventional Manual Gearboxes.

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