

# A Review on Design and Development of Four Speed Gear Box

Sourabh S. Khanawale, *M.Tech Student, Dept. of Mechanical Engineering, D.K.T.E. Society's Textile & Engineering Institute, Ichalkaranji.*

Mr. A.R.Balwan, *Associate Professor, Dept. of Mechanical Engineering, D.K.T.E. Society's Textile & Engineering Institute, Ichalkaranji.*

## ABSTRACT

*In the current globalization and tough competitive environment scenario, companies need to provide a wide variety of products to meet a wide range of customer requirements. The design development process, influences a firm's competitive priorities and needs to be considered during the strategic planning process. The economic success of manufacturing firms depends on their ability to identify the basic needs of customer and quickly create the product to meet the needs that can be produced at low cost. The paper is deliberated to offer a literature review related to design and development of gear box. The paper focuses on a major aspect i.e. to design and develop a gear box to overcome the problem like mass production and cost optimization with effectively provide service to customer and betterment of their application area.*

**Keywords** = Gear Design, 2D- Drawings, Speed/Torque.

---

## 1. Introduction –

The stage of design and development is more and more important in today's competitive world and it has a significant impact on the company's performance. Industrial profits can be maximized by careful product design by lowering production costs. Well-designed products enable the company to achieve a higher market share. In today's market scenario, the manufacturer will provide the products offered based on the price, adaptability i.e. flexibility to suit new demands and also driving customer's satisfaction.

The gearbox is a mechanical device that is used to provide the conversion of speed and torque from the rotating power source to the output shaft. [1] Transmission is the heart of the transportation system, and gearbox is the crucial part of the transmission unit [2]

The gearbox is a mechanical way of transferring energy from the device to increase the torque when it slows down. The gearboxes can be used in many applications, including applications in machine tools, industrial equipment, conveyors, and actually rotary motion power transmission, which require torque changes and speed requirements. [3] The shifting mechanism or gear shifter allows quick variation in speed thus promoting a shifting mechanism while designing a gear box will be helpful for satisfactory performance as well as smooth functioning of gears to achieve the ultimate result. [3]

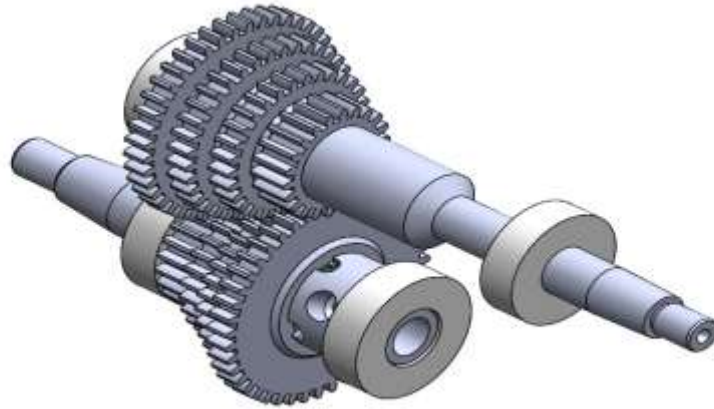


Fig. Cad model of gear box

## 2. Literature Review –

**A.Y.V. Gopi Krishna, R.V. Kiran [1] (2019)** presented a paper on Gearbox, which has a set of gears that are enclosed in a casing, the gears are mounted on shaft which rotate freely about their axis. The gears are fixed on a shaft by key, this reduces the capacity of power source required and hence less fuel consumption.

**Ujjayan Magumdar, Sujitb Maity [2] (2018)** describes the study of shaft material, gear box components and types of gearing etc. Gear box is a mechanical device which is used to provide torque and its conversion from input to output shaft. Whenever there is an requirement of frequent change in speed and torque at output shaft, multispeed gear boxes are used. Gear boxes work on the principle of meshing of teeth, which result in the transmission of motion.

**Heel Patel, Harsh Patel [3] (2018)** presented that, gear is a machine part having a clogs which contact with other toothed part in order to transmit the torque. These paper describes about various type of gears and need of efficient and compact gear boxes in industrial applications to improve their power density. Low efficiency of the gear box is a serious problem, because it increases the cost of maintenance and affects the prestige of the enterprise. Whenever a frequent change of speed/torque at the output is required, we use a multispeed multistage gearbox.

**Francesca Cura [4] (2017)** This paper proposes a method in the ISO standard environment for calculating a single global dynamic factor,  $K_{av}$ , by replacing  $K_a$  and  $K_v$ , in the case of gears subjected to shift and load conditions and this process based on the Miner damage rule and calculate the equivalent tangential Force values, including all dynamic effects.

**Neeraj Patel & Aniket Wankhede [5] (2017)** This paper has attempt to automate preliminary design of gear box by using the software like kiss. The objective function is constrained by the bending strength contact stress plane width and the number of pinions and gear teeth. The design optimizes the action of the two-stage gearbox by using KISS -soft achieved by easily supplying the requested design parameters.

**Muhammad Irfan [6] (2017)** A study on the mechanism modeled by the mechanical system was carried out. The full gear shifting process in stages, which gives the opportunity to capture the nature of the body, solve the complexities of the detailed kinematic description.

**Rahi Jain and Pratik Goyal [7] (2016)** It is shown that the spur gear is designed with software like Creo parametric and ANSYS. S the finite element method(FEM)is an easy and accurate technique for pressure analysis, FEA is performed in the finite element software ANSYS14.0. Also, due to the efficiency of the gear depends on its deformation, the variants 15nic1mo15 and SCM415 are obtained.

### 3. Discussion –

There are several papers that discuss design standards, design parameters and design specifications related to the above gearbox. The overall literature shows redesign, standardization and optimization, which is advantageous for various components of gears. The main purpose of these standards is to prepare products that are available in every corner of the world, with the same specifications without a single change. . The time of working whenever we require sudden and frequent change of speed and torque at the output traditional gear box makes it difficult to handle in construction. ,

### 4. Conclusion -

In order to reduce problems such as mass production and cost optimization, essential methods to reduce problems to effectively provide services to customers have been adopted from the above literature survey and methods used for the design and development of gear box, and in order to improve the application area, the design of gear box is based on customer satisfaction and cost optimization. it must be lightweight and compact in accordance with design standards. Shifting mechanism with gear boxes are effective on Vario aspects such as mass production, cost savings and overall performance.

### 5. References-

1. A.Y.V. Gopi Krishna, R.V. Kiran (2019) “Design And Analysis Of A Two Stage Reduction Gearbox” International Research Journal of Engineering and Technology (IRJET) Volume: 06 Issue: 12.
2. Ujjayan Majumdar, Sujit Maity, Gora Chand Chell, (2018) “Design and Analysis of Six Speed Gear Box”, International Journal of Research in Engineering, Science and Management Volume-1, Issue-9,.
3. Heel Patel, Dhruv Wadhwa, Harsh Patel, Parth Trivedi, Jay Mandalia,(2018) “ Design & Manufacturing of Reduction ”,International Journal of Research in Science, Engineering and Technology,.
4. Francesca Cura,(2017) “Method for calculating a global dynamic factor  $K_{AV}$  in gears subjected to variable velocity and loading conditions”, 7<sup>th</sup> International Conference on Fatigue Design, Fatigue Design, 29-30.
5. Neeraj Patel ,Tarun Gupta ,Aniket Wankhede ,Vilas Warudkar (2017)“Design and Optimization of 2-Stage Reduction Gearbox” International Journal of Engineering Development and research, Volume 5, Issue 2.
6. Muhammad Irfan (2017) “Modelling and optimization of gear shifting Mechanism” Application to heavy vehicles transmission systems -Thesis For Licentiate Of Engineering no 2017:01 ISSN 1652-8565.
7. Rahi Jain and Pratik Goyal (2016) “Design and analysis of gear-box using spur gear and eliminating the differential unit” International Journal of Mechanical Engineering and Technology (IJMET)Volume 7, Issue 6,