A Review on "Design, Development and Analysis of Gear Mechanism for Make in India Logo"

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***Abstract*- Creating awareness among all Engineering students about MAKE IN INIDA initiative taken by Government of India and its benefits by creating actual working model which includes spur gears, belt drive & flywheel. Also it will create an enthusiasm between students about the gear train mechanism which will be in the model. Modelling plays a very important role in design and analysis of any structures. Towards the development prospective the analysis of model will also be there which allow us to reduce the complexity, and to improve its consistency by providing designers with a short-hand representation for complex behaviour.**

I.INTRODUCTION

The Make in India initiative on September 25, 2014, with the primary goal of making India a global manufacturing hub, by encouraging both multinational as well as domestic companies to manufacture their products within the country.

Make In India is a new national program designed to transform India into a global manufacturing hub. It contains a raft of proposals designed to urge companies - local and foreign - to invest in India and make the country a manufacturing powerhouse.

According to the Prime Minister NarendraModi MAKE IN INDIA logo is Lion's step , after launching the logo of his ambitious campaign to attract companies to India. The logo is the silhouette of a lion on the prowl, made entirely of gears, symbolising manufacturing, strength and national pride.

II. LITERATURE REVIEW

1. Faisal. S. Hussain (A Study on Optimized] Design of a Spur Gear Reduction Unit)

The field of gear design is an extremely broad and complex area, and a complete coverage in any research work is not possible. In this work only parallel axis spur gear reduction unit which is the type, probably encountered most often in general practice, has been considered. A review of relevant literature in the areas of optimized design of spur gear indicates that compact design of spur gears involves a complicated algebraic analysis. El Ganainy and Naggar (2009) proposed a modelling approach to simulate 3D rocking, vertical and horizontal responses of shallow foundations based on the beam-on-a-nonlinear Winkler foundation (BNWF) model that are readily available in the element library of commercially available structural analysis programs. They provided simple calculation steps to evaluate the geometric and mechanical properties of the proposed assemblage of structural elements. The proposed model was validated with the experimental results from large scale model foundations subjected to cyclic loading. It was concluded that the proposed model can simulate the rocking and horizontal responses of shallow foundations with good accuracy.

2. Faisal. S. Hussain (Optimization of Gear Reduction Unit Through Ray Diagram)

A series of iterations is normally required to arrive at a practical combination of pinion teeth and module from their theoretical values. The present work describes the development of such a design methodology and diagnostic tool for determining the modes of failure for spur gear and also the causes of these failures have been studied. The ray diagram is also considered for finding out the minimum diameter and maximum transmission range.

3. Vera Nikolić (Dynamic Model for the Stress and Strain State Analysis of a Spur Gear Transmission)

A gear transmission dynamic model for the gear dynamic contact loading, dynamic contact stress state and dynamic contact strain state analysis is presented. A dynamic model of the transmission with four degrees of freedom is used. The transmission is analyzed using nonlinear finite elements contact formulation, using a novel software modules developed by the author used for the generalized analysis of the geared transmissions in the environment of the open source finite elements framework CODE-ASTER/ SALOME.

4. Abhinav Sharma (Optimum Design and Material Selection of Baja Vehicle)

This paper provides a complete design and analysis of "Baja vehicle" or "All-Terrain Vehicle (ATV)". While designing this Baja vehicle, all the design aspects were taken as per the rules of Society of Automotive Engineers (SAE)-2014. The main objective of this paper was to design and optimize the roll cage, front and rear suspension system, power train system. The finite element analysis (FEA) is also done on the roll cage for validating the design. Initially, a preliminary design of the roll cage was made as a 3-D model using CAD. The designed Baja vehicle is an off-road vehicle powered by 350 cc, four strokes, 10 BHP engine, driven by manual transmission. Material selection was based on the basis of factors like weight, cost, availability and performance.

5. ArvindYadav (Failure analysis of compressor & camshaft gear– An experimental approach)

This paper reports the result of an investigation of premature failure of compressor gear, camshaft gear (ie; spur gear). In this paper three 1616 CR BS III Engine investigated for subjected to matter in different types of H series vehicle. A standard investigation procedure was employed in this analysis under various conditions. It was found by analyzing various observations the gear shaft was bending and teeth failure on endurance on engine occurred under these testing ,in this paper overload test engine (on test bed) and different types of vehicle used or testing by running them at different-different speed and distance to calculate accurate reason of gear failure.

6. G. D. Mehta (An approach to estimate the diameter of a shaft supported by the bearings)

In certain industrial applications, it becomes inevitable to transmit the power from a common energy source to two or three machines. In such applications, the power may be transmitted to these machines by using a common shaft. In fact, on this shaft various transmitting components may be placed and supported by more than three bearings. Indeed, it is a prominent member in the power transmitting mechanisms, because it handles the dynamic forces induced in the different power transmitting components and the static loads due to their own weights. Nevertheless, bearing members help to sustain these dynamic forces and static loads. It is quite inevitable to consider these dynamic forces and static loads coming on the shaft, while estimating its diameter at the design stage. There are adequate methods which are readily available to estimate the shaft diameter [1,2,3]*. However, it is observed that when the shaft supported by more than three bearings the procedure, which is available, seems to be quite inadequate. Hence, it is felt that, when the shaft is supported by more than three bearings, it should be treated as a continuous beam. Thus a different approach should be applied for such a shaft. In the advent of this a moment distribution method has been used to evolve a new approach for estimation of the shaft diameter. This is given in brief in forthcoming articles.

7. Zaigang Chen (Dynamic simulation of spur gear with tooth root crack propagating along tooth width and crack depth)

Gear tooth crack will cause changes in vibration characteristics of gear system, based on which, operating condition of the gear system is always monitored to prevent a presence of serious damage. However, it is also aunsolved puzzle to establish the relationship between tooth crack propagation and vibration features during gear operating process. In this study, an analytical model is proposed to investigate the effect of gear tooth crack on the gear mesh stiffness. Both the tooth crack propagations along tooth width and crack depth are incorporated in this model to simulate gear tooth root crack, especially when it is at very early stage. With this analytical formulation, the mesh stiffness of a spur gear pair with different crack length and depth can be

obtained. Afterwards, the effects of gear tooth root crack size on the gear dynamics are simulated and the corresponding changes in statistical indicators – RMS and kurtosis are investigated. The results show that both RMS and kurtosis increase with the growth of tooth crack size for propagation whatever along tooth width and crack length. Frequency spectrum analysis is also carried out to examine the effects of tooth crack. The results show that sidebands caused by the tooth crack are more sensitive than the mesh frequency and its harmonics. The developed analytical model can predict the change of gear mesh stiffness with presence of a gear tooth crack and the corresponding dynamic responses could supply some guidance to the gear condition monitoring and fault diagnosis, especially for the gear tooth crack at early stage.

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