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A REVIEW PAPER ON SHAPE OPTIMIZATION OF CLUTCH DISC

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ABSTRACT
The present work deals with review of literature available about the shapes and functionality researches of clutch disc of an vehicle. A clutch is an necessary component used in the power transmission process. Hence it is necessary to examine the stresses induced and the vibration characteristics of the clutch disc. This may help in avoiding failures in it as well as to obtain optimum weight and cost.

INTRODUCTION
A common application of the clutch is in automotive vehicles where it is used to connect the engine to the gearbox. It acts as a mechanical connection between the engine and the transmission; it concisely disconnects the engine from drivetrain to smoothly change gears. In simple terms we can say that clutches links and di-links two rotating shafts. The research work to be carried out requires a comprehensive survey of literature to know and gain knowledge about recent studies and researches carried out in the said area.

LITERATURE SURVEY
Gowtham Modepalli studied the modelling and dynamic analysis of clutch assembly with the help of PRO-E and ANSYS software. The material trials were done by assignment of asbestos and aluminium. The parameters under consideration were equivalent elastic strain, total deformation, temperature distribution equivalent stress, and it has been carried out for both materials.

Sunny Narayan et al, worked on stresses and deformations of automotive single plate clutch assembly by applying materials. Firstly they designed the system utilizing different materials and then carried out simulation by using ANSYS software. With the application of cermet friction material they concluded that Heat Generated between the friction disk and the flywheel is the primary reason for the clutch wear and it can be decreased by having suitable material.

Jian Yao et al researched about the shapes of the clutches useful in the electric vehicles and found that wedge shaped clutch actuators were optimum. They have created absolute mathematical model of the system along with the DC motor, the wedge mechanism, and the clutch pack. they linearized the model by considering various parameters like the clutch slipping and steady state friction coefficient. They concluded that the wedge shaped clutch can be space- redemptive also they save energy. They satisfy the demand of automotive electronics use banking on the low voltage batteries.

Junqiu Li et al, have worked upon the Coordinated Control of the Downshift Power-train of a Conjunctive Clutch Transmissions system for an Electric Vehicles. They also suggested that the bigger Electric Vehicles needs transmission system with less gears to support climbing action as well as the high-speed operation in balance. They have established dynamic model of shift process which is founded on two gear combined clutch system of transmission by using the law of virtual work and the larrange principle.

K. **Adithya et al carried out** Design and Analysis of Disc in Clutch Plate By replacing the conventional material. They have replaced the conventional material with the glass fibre and realized that the cost component has been decreased and the lastingness of product life has been enhanced.

Sunny Narayan et al, worked on stresses and deformations of automotive single plate clutch assembly by applying different materials for an Toyota KUN 25. Firstly they designed the system utilizing different materials and then carried out simulation by using ANSYS software. With the application of cermet friction material they concluded that Heat Generated between the friction disk and the flywheel is the primary reason for the clutch wear and it can be decreased by having suitable material.

Neupert et al, observed that a appreciable amount of power lost in disengaged wet clutches and it is because of gummy shearing of cooling oil held between the two clutch discs. Their objective was to reduce the drag losses. To achieve this they dealt with measuring and computing analytically the drag torque of the clutch disc having radial grooving.

Vivek Thacker et al, suggested that by using para-metrical variations of bending distances and elevation of profile, it is achievable to run into the nominative cushion stiffness curve. They have achieved the cushion target as well as the minimum stress criteria through design of experiment and response surface improvement in Ansys software which It saves lot of manual work.

Liang Yua et al, Developed an all-embracing fault diagnosis know-how to analyse the failure of multi-disc clutches. They have observed wear & friction characteristics of the disc with antithetic temperature situation by using pin-on-disc test, past that they observed the surface morphology of the discs by using metalloscopy. They concluded that when the temperature transcend 175 °C, the COF reduced importantly and the deterioration of this friction material enhanced bit by bit.

OBSERVATION THROUGH LITERATURE SURVEY

The literature review helped in setting the hypothesis for the research work and to quantify the proposed methodology of the work.

METHODOLOGY

1. Literature Survey
2. Identification of Need
3. Solid Modeling of Component
4. Software analysis of the Component
5. Fabrication of Component
6. Experimentation of Component
7. Validation of Idea

CONCLUSION

The need of analyzing the shape of an clutch disc is an important task to be researched since it is of utmost importance in an vehicle operation. And we can conclude from the review that the shape optimization by suing various software is an achievable task that has been needed in the research.

REFERENCES

1) Amrita Vishwa Vidyapeetham University, Coimbatore (2015)"clutch assembly modelling and dynamic analysis" by GOWTHAM MODEPALLI. , International Journal of Mechanical and Production Engineering, ISSN: 2320-2092, Volume- 3, Issue-11, Nov.-2015.
2) Sunny Narayan, Ivan Grujic, Nadica Stojanovic, Kaisan Muhammad Usman, Abubakar Shitu, Faisal O. Mahroogi. "design and analysis of an automotive single plate clutch" Received in February 2018 Revised 23 February 2018 Accepted 2 April 2018.

3) Jian Yao, Li Chen, and Chengliang Yin "Modelling and Stability Analysis of Wedge Clutch System" . Hindawi Publishing Corporation Mathematical Problems in Engineering Volume 2014, Article ID 712472, 12 pages.
4) Junqiu Li and Han Wei"Coordinated Control of Downshift Powertrain of Combined Clutch Transmissions for Electric Vehicles" . National Engineering Laboratory for Electric Vehicles, Beijing Institute of Technology, Beijing 100081, China, received 6 March 2014; Accepted 11 May 2014; Published 1 June 2014.
5) Asst.Prof.K.Adithya S.Satheeshkumar S.Thirunavukarasu D.Vignesh T.Vishnu Paramesh"Design and Analysis of Disc in Clutch Plate By Replacing the Conventional Material"International Journal of Engineering Research & Technology (IJERT) Special Issue - 2017.
6) Sunny Narayan 1, Ivan Grujic, Nadica Stojanovic, Kaisan Muhammad Usman, Abubakar Shitu, Faisal O. Mahroogi"Design and analysis of an automotive single plate clutch". Received in February 2018 Revised 23 February 2018 Accepted 2 April 2018.
7) Neupert, Thomas, Benke, Elisabeth, Bartel, Dirk"Parameter study on the influence of a radial groove design on the drag torque of wet clutch discs in comparison with analytical models". Institute of Machine Design, Otto von Guericke University Magdeburg, Universitaetsplatz, 39106 Magdeburg, Germany.
8) "Design optimization of clutch cushion disc with the integration of finite element analysis and design of experiments" by Vivek Thacker1 and E Vijayaragavan. Department of Mechanical Engineering, SRM IST, Kattankulathur – 603203.
9) "Investigation on the failure mechanism and safety mechanicalthermal boundary of a multi-disc clutch" by Liang Yua, Biao Maa, Man Chena, Heyan Lib, Jikai Liuc, Mingyang Li. College of Urban Transportation and Logistics, Shenzhen Technology University, Shenzhen 518118, China.