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THE BRIEF REVIEW ON THE SINGLE CLUTCH PLATE

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ABSTRACT

The engine transmits the dynamism needed for vehicle motion to the wheels through the flywheel, clutch system, and driveline. The clutch is responsible for drawing and transmitting energy from the flywheel. The object of this paper is to study the concept and evaluate the single plate clutch this is done by using the CATIA V5 modelling programme that is commercially available. In order to satisfy the input parameters, a programme is coded in the C language and the resulting clutch specification is obtained accordingly. Here, as a case study, one of the issues that are frequently posed when constructing clutches was discussed, and those criteria were taken into consideration during the software feedback. The input data is also used to design the single plate clutch of the necessary material on CATIA-V5, and the required research has been done.

KEYWORDS: *Analysis language, CATIA V5, Software, Single Plate Clutch.*

1. INTRODUCTION

Via the flywheel, the clutch arrangement and the driveline, the dynamism required for the motion of a vehicle is conveyed by the engine to the wheels. The clutch draws and transmits energy from the flywheel. Towards the driveline. The friction torque works on the tension surfaces of the clutch as an engaging force for the driveline during the engagement process. By working the clutch pedal, drawing the clutch into the handle in the case of a bike, or pressing it down to the floor of a bike, it is disengaged[1].

The most widely used clutch is developed and modelled using CATIA V5 modelling software in this analysis paper of a single plate clutch, and a programme has been written on C that accepts values of power, speed, coefficient of friction to name a few, and provides an output for the necessary parameters[2]. The CATIA V5 model presented an accurate design of what the clutch plate would look like and what load it would handle, depending on the material selected. C Program except that a programme was written with the necessary formulas for one unique problem, it was meant to work much like any calculator[3]. This software would then include responses to diameters, axial force, transmitted torque, and torque[4].

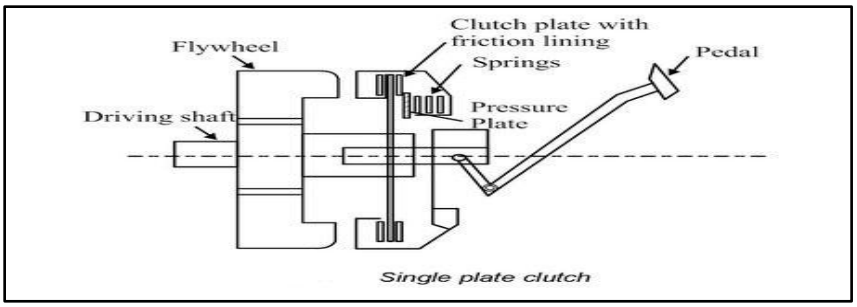

Figure 1: Single plate clutch

There is one clutch plate in a single clutch. This embrace is based on the tension principle. In automobiles, it is the most common type of embrace (Figure 1).The clutch consists mostly of two members one installed on the driving shaft and another in the driven shaft, two shafts parallel and concentrated; one shaft is mounted on its casing, while the second shaft is divided so that it can travel axially[5].

1.1 Components of Clutch Plate

1.1.1 Flywheel: The flywheel, an embrace board, pressure plate and clutch cover, release button, primary shaft and clutch shaft form one plate clutch module[6]. The flywheel is part of the engine and often used as part of the embroidery. It is a driving member which combines with the clutch shaft pressure plate and houses with flywheel roller covers. As the engine crankshaft spins, the flywheel rotates.

1.1.2 Pilot Bearing: The pilot bearing or coil press the end of the crankshaft to support the end of the input shaft for transmission. The pilot coating avoids a wobbling up and down of the transfer shaft and the clutch disc as the embrace is released. The disc center on the flywheel also serves the input shaft[7].

1.1.3. Platform for clutch or disc: It is the driven component of the single-plate clutch and is frozen on both surfaces. It has an internal hub to restrict the axial journey on the splintered gearbox driving shaft. This tends to dampen torsional friction or the pushing torque between engine and transmission.

1.1.4 Pressure plate: The plate is made of special iron cast. That is the largest portion of the clutch. The key duty of the pressurization plate is to uniformly touch the driven platform face, where the pressure springs have the power to distribute the engine's entire torque. From its machined surface, the friction plate presses the clutch plate to the tread wheel. Pressure springs are fitted between the pressurized plate and the clutch cover. When release levers are depressed by the toggle or release levers are rotated accordingly, the weight is released from the flywheel.

1.1.5 Clutch plate: The plate is made of special iron cast. That is the largest portion of the clutch. The key duty of the pressurization plate is to uniformly touch the driven platform face, where the pressure springs have the power to distribute the engine's entire torque[8]. From its machined surface, the friction plate presses the clutch plate to the tread wheel. Pressure springs are fitted between the pressurized plate and the clutch cover. When release levers are depressed by the toggle or release levers are rotated accordingly, the weight is released from the flywheel[9].

1.2 Benefits:

1. Clutch Single Plate is not pricey.
2. It is maintenance-efficient.
3. Compared to cone clutch, gear shifting is simpler, because it's less movement.
4. Single Plate Clutch is more effective because of the inconvenience of cone attachment.

1.3 Disadvantages:

1. Greater force is necessary to decommission since the springs would be harder[10].

1.4 Applications

1. In trucks, buses, and vehicles, etc., single plate clutches are used.
2. Used individual platform clutches with wide radial space.
3. Since adequate surface area is available in single plate clutches for heat dissipation, no cooling oil is required. Single platform clutches are also sterile.

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2. DISCUSSION

The engine transmits the dynamism necessary for vehicle motion to the wheels through the flywheel, clutch system, and driveline. The clutch is responsible for drawing and transmitting energy from the flywheel. In the direction of the driveline. During the engagement phase, the friction torque acts as an engaging force for the driveline on the clutch's tension surfaces. It is released by manipulating the clutch pedal, dragging the clutch into the handle of a bike, or pushing it down to the floor of a bike. In this analysis paper of a single plate clutch, the most widely used clutch is developed and modelled using CATIA V5 modeling software, and a program has been written in C that accepts values of power, speed, and coefficient of friction, to name a few, and provides an output for the necessary parameters. Depending on the material used, the CATIA V5 model provided a realistic representation of what the clutch plate would look like and what load it could carry. Except for the fact that a program was developed with the essential formulae for a single problem, it was designed to function similarly like a calculator. The responses to diameters, axial force, transmitted torque, and torque would all be included in this program. The plate is crafted from a unique iron alloy. The majority of the clutch is made up of this. The pressurization plate's primary function is to contact the driving platform face equally, allowing the pressure springs to evenly transmit the engine's torque. The friction plate forces the clutch plate to the tread wheel from its machined surface. Between the pressured plate and the clutch cover are pressure springs. The weight is removed from the flywheel when release levers are depressed by the toggle or release levers are turned suitably.

3. CONCLUSION

This project tells us how numerous materials on CATIA V5 can be studied to see their deformations and stresses. The C-based software complies with the formula used to theoretically evaluate different parameters. It was observed that the value of the evolved force was higher than that of uniform wear theory under the Uniform Pressure Theory, which used the latter for the configuration of the clutch platform. The findings were very satisfactory, which was expected. The strain as well as the deformation plots clear the idea of which parameter the friction clutch of the single plate should have been taken into account. Bronze is chosen to build the single according to the results obtained.

REFERENCES

1. P. Psyllaki, G. Pantazopoulos, and P. Karaiskos, "Failure mechanisms of an automobile clutch assembly cast iron pressure plate," Journal of Failure Analysis and Prevention. 2012, doi: 10.1007/s11668-011-9523-3.

2. R. Mäki, "Wet clutch tribology : friction characteristics in limited slip differentials," Dr. thesis / Luleå Univ. Technol. 1 jan 1997 → … NV - 200528, 2005.

3. J. Hu, Z. Peng, and C. Wei, "Experimental research on drag torque for single-plate wet clutch," J. Tribol., 2012, doi: 10.1115/1.4005528.

4. R. Mäki, B. Ganemi, E. Höglund, and R. Olsson, "Wet clutch transmission fluid for AWD differentials: Influence of lubricant additives on friction characteristics," Lubr. Sci., 2007, doi: 10.1002/ls.33.

5. J. C. Wheals et al., "Design and simulation of a torque vectoring^{TM} rear axle," 2006, doi: 10.4271/2006-01-0818.

6. W. Schreiber, F. Rudolph, and V. Becker, "The new dual clutch gearbox from Volkswagen," ATZ Worldw., 2003, doi: 10.1007/bf03225188.

7. S. Narayan, I. Grujić, N. Stojanović, K. Muhammad Usman, A. Shitu, and F. Mahroogi, "DESIGN AND ANALYSIS OF AN AUTOMOTIVE SINGLE PLATE CLUTCH," Mobil. Veh. Mech., 2018, doi: 10.24874/mvm.2018.44.01.02.

8. M. De Melo Júnior, L. K. Miyashita, N. J. Silva, S. A. Gaeta, and R. M. Lopes, "Reproductive traits of Euterpina acutifrons in a coastal area of Southeastern Brazil," Mar. Ecol., 2013, doi: 10.1111/maec.12041.

9. D. R. Andersson et al., "Smart access to small lot manufacturing for systems integration," 2018, doi: 10.23919/PanPacific.2018.8319009.

10. W. Krenkel, "Carbon Fibre Reinforced Silicon Carbide Composites (C/SiC, C/C-SiC)," in Handbook of Ceramic Composites, 2006.

11. Shiv Pratap Singh Yadav, Sandeep G M, Aditya Kedilaya , Arjun B Curam, C V Srihari Raghavan, and Kalyan Chilakamarri, "A Review on Single Plate Clutch," Int. J. Eng. Res., 2017, doi: 10.17577/ijertv6is040587.