

Dual Clutch Transmission of Power Train: An Overview

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Abstract

The best possible responses during shifting in dual clutch transmission, it is to integrate clutch and engine control. Clutch is main device which is used to transmit the motion between to coaxial shaft. The application of torque based on power train control for multi-speed of power shifting capable of electrical vehicles and the operation of two clutches during a gear shift process in dual clutch transmission is considered. An optimization lots of problem is created in compact form and energy loss in the clutch are minimized. Torque estimation it gives the response of hydraulic system, also included simulation of poor estimation and finally increased powertrain vibration during and after shifting. It is to reduce shift transients developed in dual clutch transmission of powertrains. This result based on clutch and engine, Significantly improves powertrain response.

Keywords: *Keywords: Dual clutch transmission, Powertrain, Gear shift*

INTRODUCTION

The dual clutch transmission was initially developed 1940, it has been possible to efficiency of manual transmission DCTs highly to assemble production requirements and provide improved efficiencies by consumers [1]. It is engine transmission control system including clutch hydraulics, and provide a control of clutch and engine speed, torque to achieve results during the shift period, And different speed, torque, inertia changes [2], In electrical vehicles new strategies for improve efficiency and higher energy efficiencies than single speed equivalents. It is focused on energy consumption and performance improvements.

Due to main fact of dual clutch transmissions high efficiency and shifting smoothness, and most of them are commonly used in automotive industry [3]. So torque transmission is seamless through using two clutches, so they are overlap of two clutches are critically in DCT during gear shift process. In electrical vehicles by using two speed dual clutch transmission is generally ideal transmission mode.



Fig. 1. Actual Model Dual clutch transmission.

Overview of Dual Clutch

DCTs where the two clutches are organized concentrically the larger outer clutch drives the even-numbered gears and the smaller inner clutch drives the odd-numbered gears. Shifts is accomplished without interrupting Torque distribution is to the driven by the wheels, by way of making use of the some engine torque to at least one clutch at that same time as it being disconnected from the any other snatch. considering the fact that alternate equipment ratios can preselect an ordinary equipment on one equipment shaft even as the automobile is being pushed in an even gear (and vice versa), DCTs are the fastest-transferring avenue vehicle transmission available and are even capable of shift quicker than a expert racing driving force the usage of a manual transmission. DCTs can even shift more fast than vehicles equipped with single-grasp compute-

rized-guide transmissions (AMTs), also called single-clutch semiautomatics.

Dual clutch Transmission

A conventional manual gearbox, these houses all of its gears on a single input shaft and also working as one unit, the DCT split up odd and even gears on two input shafts. The outer shaft is hollowed out, making room for an inner shaft, which is nested inside [4]. The outer hollow shaft feeds second and fourth gears, while the inner shaft feeds first, third and fifth. The diagram which shows this arrangement for a five-speed DCT. one clutch that controls second and fourth gears, while another independent clutch controls first, third and fifth gears, and also lightning-fast gear changes and keeps power delivery constant. Manual transmission is not used, it must use one clutch for all odd and even gears. A Dual clutch transmission sometimes referred twin clutch transmission is a type of automatic transmission or automated automotive transmission. It uses two separate clutches for odd and even gear sets. It can be decided two separate manual transmissions with their clutches contained within one housing, and working as one unit.

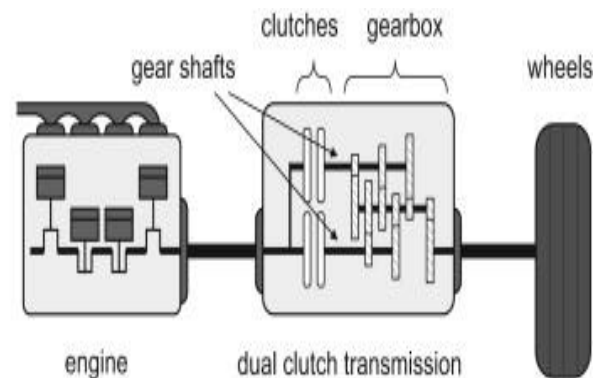


Fig. 2. Working Dual clutch Transmission.

Power Train System Problems

The power on upshift process of DCTs is usually divided into two phases, Torque phase and inertia phase. before phase, one clutch is engaging and another clutch is disengaging. at that time gear ratio transmission is unchanged the current value. power is transmit from disengaging clutch to engaging clutch, In electrical vehicle powertrain subject to based on front wheel drive vehicle platform. before shift process , two different gear pairs and gear ratios may be engaged at the same time. In time sequence both disengaging and engaging clutch are overlapping to each other, also the slip between two clutches, and major effect on shift control and shift time. Power can transmit two clutches Whole shift there is no power interruption between engine and wheel speed. So this is major problem on powertrain system. Two-speed DCT is power transmission system of electrical vehicles installed [5].

How Twin-Clutch Transmission Work

The dual clutch transmission two separate transmissions with a pair of clutches with respect to between two clutch ,One transmissions gives odd-numbered speeds such as first, 1/3 and 5th gear, the other affords even-numbered speeds like second, fourth and sixth equipment.

When the car starts out the “odd” gearbox is in first gear and the “even” gearbox is in second gear, the clutch engages the odd gearbox and car starts put in first gear when it’s time to change gears, the transmission simply uses the clutches to switch from the odd gearbox to the even gearbox, box a near-instant change to second gear. The odd gearbox immediately pre-selects third gear .At the next change, the transmissions swaps gearbox again, engaging third gear, and the even gearbox pre-selects fourth gear. The twin-clutch transmission

controller calculated the next gear change based on speed and has the “idle” gearbox.

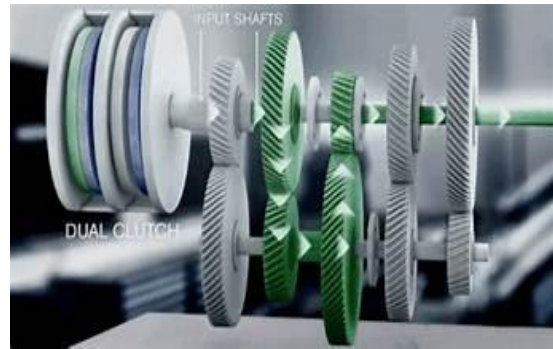


Fig. 3. Actual Working Dual Clutch Transmission.

Gear Shifting Problems

In all operation generally used two clutch used in shifting process as we considered gear shift is optimization problem created contribute to further analyses and control the design DCTs can be regarded two manual transmission with clutch-to-clutch shifting received, so there are high efficiency good shift quality smooth and fast shift control can be transmit through continuous power transfer in between input and output transmission of position control of clutches [4]. Finally control objective focuses on smoothness in gear shifting process in simulation result show that jerk can be reduced. In dual clutch transmission analysing the power transmission system in electric vehicles that installed in two-speed DCT.

CONCLUSION

The development of speed and torque Oriented shift control methods for dual clutch transmission have been presented this paper. Shift control methodologies focus on the integration of clutch torque, engine speed and torque control techniques. Optimal control of dual clutch transmission for gear shift process. so optimization problem is developed to minimize heat reduced dissipation, In gear shifting process during reduce jerk in vehicles can be indicates comparison with conventional upshift controller developed smoother shift and lower jerk.

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