The Old Dominion University Formula SAE car currently uses the manual transmission that is already installed in the motorcycle engine. Manual transmissions are more efficient than automatic transmissions, roughly 96 percent compared to 86 percent, respectively [1]. However, manual transmissions require the driver to operate the clutch pedal and manually shift the gears, which can be difficult for some drivers [2]. A Dual Clutch Transmission would improve the efficiency of the shifting process of the formula car. The DCT would utilize two clutches, two transfer shafts and a series of actuators to allow for an automated shifting of gears. This would provide a faster and smoother shifting process and eliminate the need for the driver to manually shift gears [1, 2].

Although the DCT would improve the efficiency of the formula SAE car transmission, the torque and variations during shifting can affect the quality and smoothness of the shifting process. Clutch slippage during the inertia phase caused by the transfer between gear ratios can also affect the quality of the shifting process [3]. Estimating the clutch torque and the overall drag torque of the transmission is crucial to an efficient design, thereby improving fuel efficiency and prolonging the life of the transmission [2, 4, 5].

There are limited studies for the powertrain losses of transmissions, including the losses in the gearbox and wet clutches together [4]. Studies performed have used simulations with computer software, such as Matlab/Simulink to perform analysis of the DCT drag torque and shifting process [3, 4, 6]. However, there is a lack of real world analysis and testing of DCTs in actual vehicles [6]. Research into the use of a Dual Clutch Transmission in the Formula SAE car is needed to determine the feasibility of its use in future SAE competition vehicles.

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