Design and Engineering of a Cam-Based Infinitely Variable Transmission for Automotive Use

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Our engineering study aims to develop and create a transmission which alleviates all the current issues of the modern CVT, making it viable for usage on a majority of light duty vehicles, by utilizing the interactions in variably eccentric cam based gear reductions. Mathematical models were first derived from the geometric constraints of cam interactions. These models were used to define the constants that would be used in the design and construction of our final product, as well as used for simulation and theoretical calculations of efficiency and gear ratios. This data was then used in Computer Aided Design (CAD) programs to design a three dimensional model of the transmission and calculate factors like strength and weight. After utilizing Finite Element Analysis (FEA) and other simulations, we could reach a conclusion about the effectiveness of this design. The result of several iterations was built as a prototype to prove the validity of the theoretical computation. Computer models of our CVT resulted in the ability for constant unfluctuating power delivery eliminating the characteristic variability of brushed electric motors. Average efficiency gains were also noted over a reference brushed electric motor. Also, our manufactured model was successful in reproducing the entire range of gear ratios. Therefore, variably eccentric cam based gear reducers could be a viable replacement for a majority of light duty vehicles, having the potential to not only increase the vehicle's efficiency, but also its overall power output and performance.

Awards Won:
Third Award of $1,000