Investigation of Fluid Flow in a Torque Converter's Stator Using Computational Fluid Dynamics Methods.

by

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CERTIFICATE OF AUTHORSHIP/ORIGINALITY

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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ABSTRACT

An automotive torque converter is a widely used hydro-mechanical device for transferring engine power to the transmission in the modern automotive industries. The typical three-dimensional geometrical structures of the stator, pump and turbine made this torque converter very complex. The goal of this study is to gain a sound understanding of the complex three-dimensional fluid flow inside the stator. This study was performed using Computational Fluid Dynamics software. For the sake of gaining a sound understanding, all three elements of the torque converter were included in the simulation. The geometry for the torque converter used was a donation from Dr Mahesh Athavale (Manager, CFDRC). However, the construction of the geometry was thoroughly studied to gain a comprehensive understanding of the construction as well as making the necessary changes. The performance of the torque converter was compared with existing data. This was undertaken for the validation of the work. Then the fluid flow was studied for a changed stator blade number. Thus the variation of performance can easily be noticed with the change in the geometrical structure. The effect of pseudo plastic fluid and dilatant fluid was also studied in order to determine the performance characteristics. All these investigations would lead to a clearer realization of the fluid flow inside the stator and thus help to increase the performance of the torque converter. Out of this research studies on torque converter two publications have been produced.

1. IMECE2011-65078: Effects of Number of Stator Blades on the Performance of a Torque Converter, which was published by the ASME conference 2011, held on November 11-17, 2011, Denver, Colorado, USA.

2. 18th AFMC-2012: Numerical Study of Performance of a Torque Converter Employing a Power-Law Fluid, which was published by the AFMC on its 18th conference, held on December 3-7, 2012, Launceston, Tasmania, Australia.

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