A Study of Rate of Temperature Change during Tire Curing using Computational Fluid Dynamics

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Abstract

One of the most important steps of tire manufacturing is curing. The purpose of the curing is to apply high pressure and temperature over a period of time to unvulcanized rubber so that the rubber is cured to the point of best material properties. In this research, fluid flow analysis was considered to understand airflow pattern in an autoclave for better quality of product. We present preliminary results of temperature distribution of heat transfer in autoclave using Computational Fluid Dynamics package, OpenFOAM. The turbulent model was verified by comparison with the experimental results to obtain an accurate heat transfer coefficient. It was found that the error was 12%. The results from the CFD simulation and experiments are in good agreement. Consequently, this turbulent model can be used to determine heat transfer coefficient to achieve a better and more efficient curing process.

Keywords: Computational Fluid Dynamics, Curing, Heat transfer coefficient, Simulation