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Simulation and Validation of Airflow Past Hand-Shape Mold using OpenFOAM

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Abstract. This paper aimed to present a wind tunnel study of the effect of airflow past the hand-shape mold, especially airflow around the gap between the fingers of the mold. The study interested in the behavior of airflow past the mold on the different angles which was valuable to vulcanize rubber glove in the oven. The wind tunnel experiments were performed on various angle of attack of hand-shape mold from 0 to 180 degrees under the airflow velocity of 5 to 20 m/s. The 3D simulations were carried out by using open source code software, OpenFOAM. The k-ε model was used to simulate the turbulent flow past hand-shape mold. The pressure-velocity coupling problem and the convection-diffusion term were solved by using SIMPLE algorithm and Upwind scheme, respectively. The drag force by airflow on the rubber glove mold which obtained by the computational fluid dynamics (CFD) method was compared with the experimental data. The comparison between CFD simulation and the experimental data showed a fairly close agreement and the average error was less than 13.96%. This developed model will be used to optimize the mold installation inside the rubber glove oven in the further works.

Keywords: Wind tunnel, OpenFOAM, Simulation, CFD.