

Mongkol Kaewbumrung, 2008: CFD Applications in Hard Disk Drive Industry. Master of Engineering (Aerospace Engineering), Major Field: Aerospace Engineering, Department of Aerospace Engineering. Thesis Advisor: Assistant Professor Vejapong Juttijudata, Ph.D. 76 pages.

There are many problems in hard disk drive industries that will be beneficial from CFD. This work focuses on two main problems – an operator working position at the workbench in a clean room and a reduction of an aerodynamic force on HSA in HDD.

The effect of air ionizer and operator positions at the workbench on air recirculation is investigated by standard $k - \varepsilon$ model. The result suggests that the current position of the air ionizer and the operator produces the least amount of circulation. Furthermore it also suggests that the distances between the operator and the workbench, and the operator and the air ionizer are not sensitive to the amount of circulation but the vertical distance between the air ionizer and the workbench affects the amount of circulation significantly. Therefore the operator is suggested to maintain the current working position at the workbench with more flexibility in the distances between the operator and the workbench, and the operator and the air ionizer.

The effect of blocking plate geometry (the thickness, angular and radial dimension) to the aerodynamic force on head stack assembly in a 2.5 inch HDD with a magnetic media spinning at 15,000 rpm is studied by RNG $k - \varepsilon$ model and LES. Result from RNG $k - \varepsilon$ model suggests that the largest blocking plate reduces the largest amount of drag force on HAS and average velocity inside the HDD. LES confirms the finding from RNG $k - \varepsilon$ model and indicates that the blocking plate reduces the amount of drag on HSA by means of velocity reduction. The result also suggests flow structure changed significantly, and power consumption increases by 15%.

Student's signature

Thesis Advisor's signature

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