

## Case Study



**ANSYS**

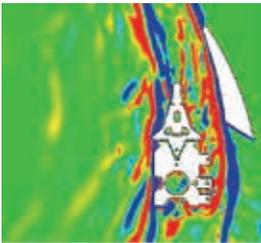
+ Hutchinson Technology Inc.

*"We have used ANSYS Fluent and ANSYS Mechanical products to explore improvement opportunities for our suspension assemblies and to establish guidelines for future products. Deployment of Fluent and Mechanical has allowed us to reduce the cost of prototypes fabrication to achieve the optimum design."*

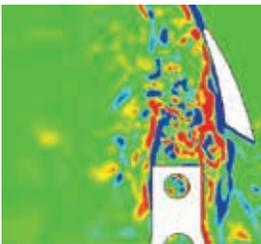
**Mohammad R. Kazemi, Ph.D.**

*Principal Engineer  
(CFD and Flyheight Analysis)  
Hutchinson Technology Inc.*

## Simulation Identifies Disk Drive Design Modifications that Improve Performance



Instantaneous contours of dimensionless axial vorticity at plane that is parallel to disk surface and passes through suspension



Instantaneous contours of dimensionless axial vorticity at plane that is parallel to disk surface and passes through middle of arm

*Mohammad Kazemi, Analysis of the Slider Off-Track Vibration Caused by the Aerodynamic Loads Associated With Different Components of a Head Stack Assembly in a Disk Drive, IEEE Transactions on Magnetics, © 2008 IEEE*

Disk drive technology continues to advance as manufacturers expand their product offerings and race to deliver the highest-performing drives at the lowest cost. Hutchinson Technology's goal is to meet customers' increasing requirements for speed, capacity and reliability and to maintain market position in producing complex suspension assemblies.

### Technology Used

ANSYS® Fluent®, ANSYS Mechanical™

### Engineering Solution

- ANSYS Fluent software was successfully benchmarked against experimental data for flow in a simple drive.
- Fluent and Mechanical simulation software were used to compute the fluid-structure interactions (FSI) in a 3.5 inch actual hard drive operating at 10,000 rpms.
- Simulation was used to identify vortex shedding within the drive, which played a significant role in causing vibration.

### Challenges

One of the primary challenges in hard disk drives involves the precision of motion of the head suspension assembly. Airflow-induced vibrations increase the uncertainty of the position of the slider, which must be sited properly for data to transfer to and from the disk. These issues are most important in high-speed drives and high-areal data density drives. In high-speed drives, air flow vibrations are strong and reduce the accuracy of the head assembly. In high areal-data density drives, the data track spacing is very fine and small suspension vibrations can reduce drive performance.

### Benefits

- The Hutchinson Technology Inc. team identified that redesign of certain components avoids vortex shedding during operation and, consequently, reduces vibration and improves accuracy of the position of the head. Precise positioning of the head allows for smaller track spacing and consequently higher area density.
- Use of simulation software from ANSYS reduced the need for actual experiments on physical prototypes, saving both time (several weeks) and money (several tens of thousands of dollars).

### Company Information

Hutchinson Technology Inc.'s Disk Drive Component division is a global maker of disk drive suspension assemblies. As the industry's only vertically integrated suspension supplier, the company is well positioned to deliver the rapid prototyping, speed to volume, high level of quality and lowest overall costs that disk drive makers require for their current and future products.

### ANSYS, Inc.

www.ansys.com  
ansysinfo@ansys.com  
866.267.9724