Ansys

Ansys Fluent + Seagate

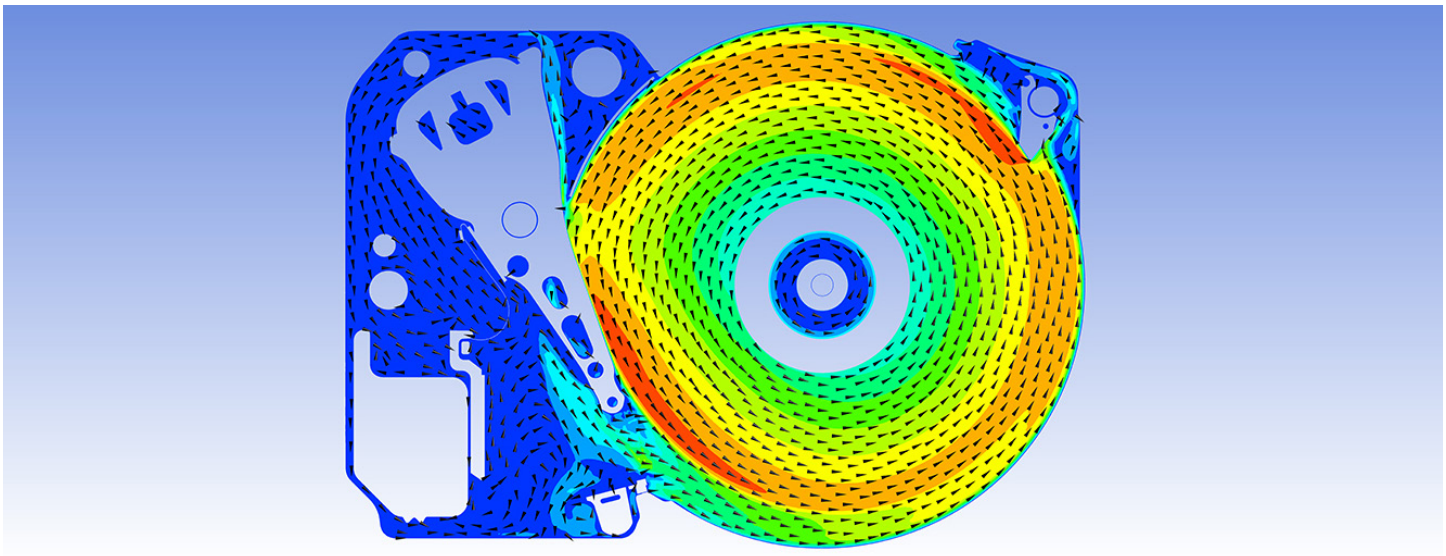
"With NVIDIA DGX and Ansys Fluent software, we are able to reduce the runtimes of our internal drive flow models from hours to minutes, approximately a 50 times improvement."

— **Kent Forbord**
Senior Director of Advanced Mechanical Development / Seagate

CASE STUDY

Seagate Accelerates Simulation by 50X with Ansys + NVIDIA

As artificial intelligence (AI) becomes more prevalent across industries around the world, the need for greater data storage is rapidly increasing. To meet demands sustainably, Seagate Technology, a leader in mass-capacity data storage solutions, uses Ansys simulation and NVIDIA graphics processing unit (GPU) hardware to develop its Mozaic hard drive technology, which stores data at previously unachievable levels without increasing power consumption.



A computational fluid dynamics (CFD) simulation of a hard drive's internal flow velocity in the Ansys Fluent platform. Image: Seagate Technology.

Challenges

Although adding disks to a hard drive increases storage capacity, it also increases material usage and power consumption. Alternatively, increasing areal density — the storage capacity per square inch of an object's surface — enables each disk to hold greater data without using more material or disks.

Seagate's previous workstation for computational fluid dynamics (CFD) studies to identify optimal designs for greater storage capacity was comprised of 40-core CPUs. Seagate's CPU-based runtimes were approximately one month for chassis-level aeroacoustics models with a mesh size of about 50 million cells, while finer, higher-quality mesh containing up to 100 million cells took even longer. This was a cumbersome and time-consuming workflow that had to be changed.

Exos Mozaic 3+ hard drives hold up to 32 terabytes (TB) of data.

Technology Used

- Ansys Fluent®

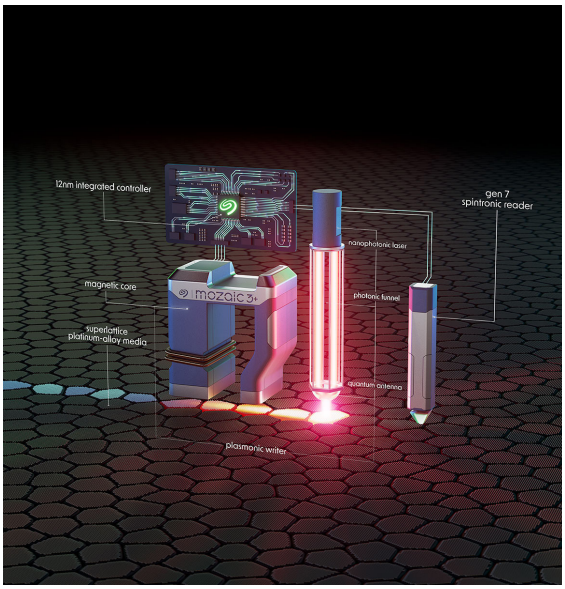
Engineering Solutions

By integrating **Ansys Fluent fluid simulation software** and NVIDIA's accelerated compute power via an NVIDIA DGX system, Seagate reduced the runtimes of their internal drive flow models from hours to minutes, resulting in a 50X improvement.

To increase track densities, Seagate uses Fluent software to optimize key airflow metrics in the drive, such as particle transport, windage drag, and structure excitation. At the system level, engineers perform thermal analyses to model the dynamic excitation on the outside of the drive, temperature, and pressure drop to assess cooling flow throughout the system. The team also performs aeroacoustics simulation to improve system chassis and fan designs.

Running these studies on Fluent software's native multi-GPU solver, enabled by NVIDIA GPUs, enabled Seagate to greatly reduce their overall runtimes. This helped them meet their goal of reduced prototyping and physical testing, which ultimately led to shorter design cycles.

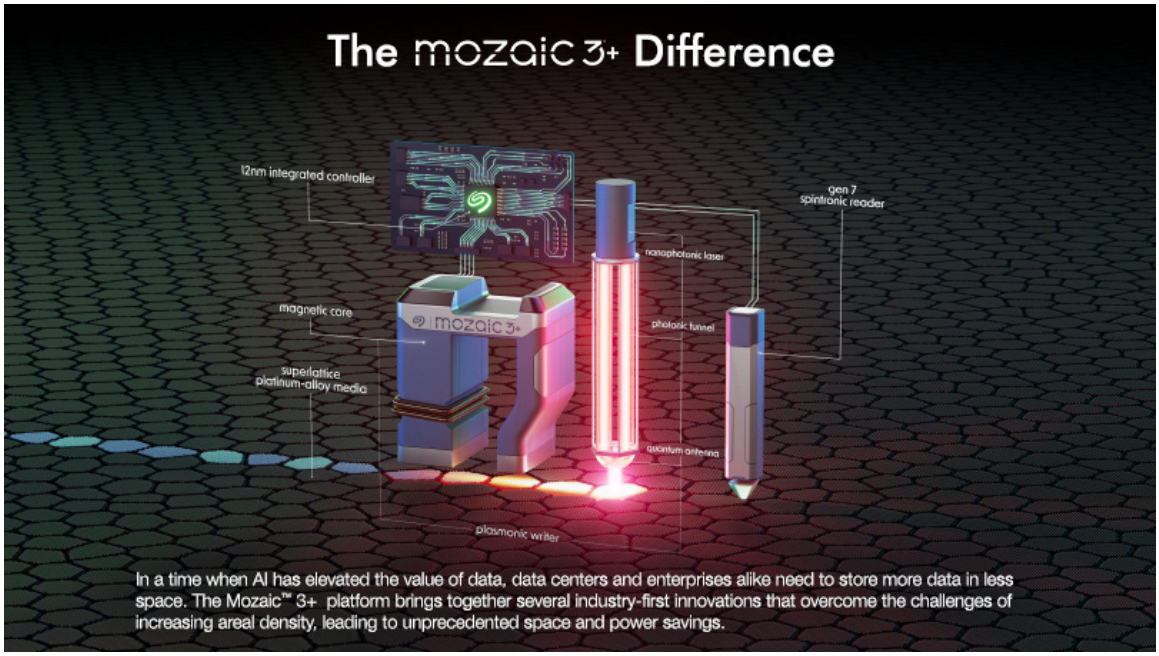
Seagate's current Mozaic platform, Mozaic 3+, features areal densities of 3 TB per platter. Anticipated models Mozaic 4+ and Mozaic 5+ will store 4 TB and 5 TB of data per platter, respectively.



Forthcoming Seagate hard drive models Mozaic 4+ and Mozaic 5+ will be able to store 4 TB and 5 TB of data per disk, respectively.

Benefits

- Seagate reduces the runtimes of its internal drive flow models from hours to minutes — approximately a 50X improvement — and reduces external aeroacoustics model runtimes from one month to less than one day.
- With reduced solve times, Seagate evaluates more designs in a shorter time and achieves a more optimal design.
- Seagate reduces prototyping and physical testing through more upfront modeling and design optimization, which helps shorten the design cycle.
- Ansys and NVIDIA technologies enable Seagate to streamline the innovation process and speed up time to market.



Designed with the most advanced materials and structures, Seagate's Mozaic drives enable data centers to store more data in less space more efficiently.

/ Company Description

Since its founding over 45 years ago, Seagate has produced more than 4 billion TB of data capacity and currently offers a full portfolio of storage devices, systems, and services. Recognizing today's storage demands in the face of expanding AI technologies, Seagate uses simulation and accelerated compute power to amplify design and development.

Seagate's Mozaic hard drives incorporate the company's unique implementation of heat-assisted magnetic recording (HAMR) and are making a substantial difference in the industry. With greater areal density, the hard drives store more data in the same space. At the same time, the upgraded workflow enables Seagate to produce more drives at a faster rate.

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When visionary companies need to know how their world-changing ideas will perform, they close the gap between design and reality with Ansys simulation. For more than 50 years, Ansys software has enabled innovators across industries to push boundaries by using the predictive power of simulation. From sustainable transportation to advanced semiconductors, from satellite systems to life-saving medical devices, the next great leaps in human advancement will be powered by Ansys.

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