

HGST at the heart of CERN

Power efficiency, reliability and capacity are at the core of what's needed to store the computer data from CERN's scientific research, and HGST's Ultrastar™ 5K3000 has a vital role to play.



Computer Centre
Photographer - Nelson Alves © 2012 CERN

Deep beneath the Franco-Swiss border, near Geneva, in a tunnel running for 27km lies the Large Hadron Collider (LHC), the world's largest and highest-energy particle accelerator. The LHC is the jewel in the crown of CERN (European Organisation for Nuclear Research), a pan-European venture in scientific research, founded in 1954.

CERN's discoveries help to demonstrate what the universe is made of and how it works, and its scientists' recent work has included dynamic and challenging insight into the Higgs boson.

The storage of, and access to, the data produced by these physics experiments are the key roles for CERN's IT facility. CERN IT features storage and computing platforms for processing high-energy physics scientific data and provides large clusters for the scientists, so they can produce their computing results. HGST's Ultrastar 5K3000 has been chosen to play an important role at the core of the facility's computing needs, for its ability to meet the most important demands of power efficiency, capacity and reliability.

Quietly efficient

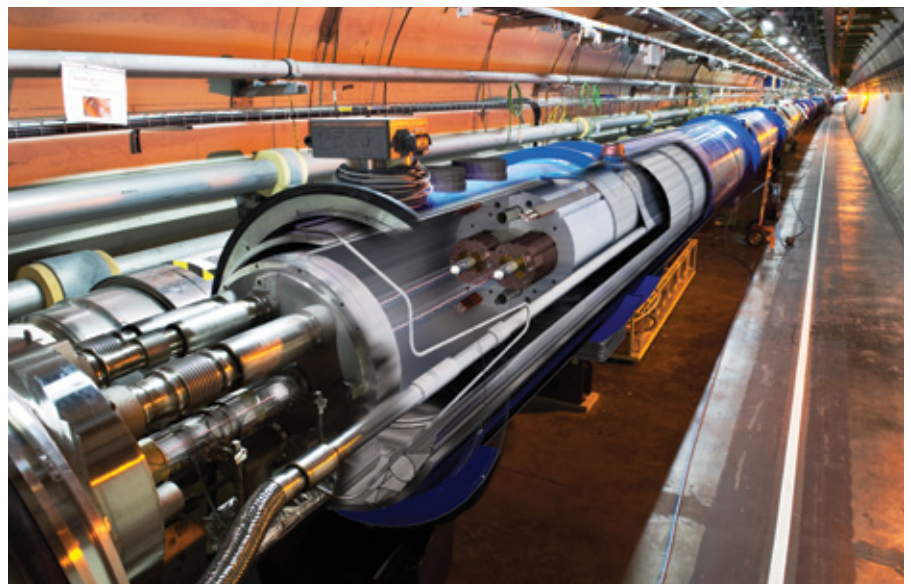
The IT facility's data centre occupies two complete floors and currently hosts 8,059 servers with 64,623

processing cores, 62,660TiB of raw disk storage and a large tape archive. It is a 2.9MW facility, which by the end of 2012 will be extended to 3.5MW. CERN IT does, however, have restrictions to work within and the HGST Ultrastar 5K3000 has proved highly effective in matching these. The facility has limitations on available electric power and cooling for the computing equipment. Power efficiency has become a major stipulation in IT procurement and so CERN IT favours equipment providing high compute or storage capacity per Watt of electrical power. For this reason, the 3TB capacity with 512 bytes native support, and CoolSpin™ technology of the Ultrastar 5K3000 has made it a popular and efficient choice.

The Ultrastar's Advanced Power Management is essential, offering five levels of granularity to help manage power consumption including: normal idle, unload idle, low RPM idle, standby, and sleep modes,

“I think the Ultrastar 5K3000 is a great product for CERN because it is very power efficient and appears reliable. It's going to be very interesting to see how this product develops and I'm confident it's going to be a success.”

Olof Barring
Head of facility,
planning and procurement



3D view photo of the LHC Machine

and its standby and sleep modes consume less than 1W. The drive's CoolSpin™ technology optimises motor speed and provides a balance of performance, power utilisation and acoustics.

Rugged and reliable

CERN also puts a high value on the reliability of its array of hard disk storage. The drives are required to be hot swappable, and while hardware RAID and software RAID configurations ensure hard disk failure doesn't mean data loss, there can be degradation during RAID rebuilds or data reconciliation, which can have an impact on scientific data processing. The Ultrastar 5K3000's 5-platter mechanical design helps deliver reliability and also means reduced downtime and service calls.

Olof Barring, head of facility, planning and procurement said: "As one of the largest hard disk manufacturers for enterprise, HGST plays an important role in providing CERN with reliable disk storage media for bulk storage of scientific data."

Reliability is also an issue because CERN lies at the heart of a data production chain. Its role involves making sure all data is collected from the scientific facilities and experiments derived there and to store that data, but CERN also has a responsibility to distribute and receive data with other sites.

As a Tier-0 facility CERN sits at the centre of the LHC Computing Grid, which was established over 10 years ago, and comprises 140 computing

centres in 35 countries. It handles the volume of data produced by the LHC experiments but also shares this data with Tier-1 facilities. Data is also distributed to Tier-1 sites in order to have a safe copy distributed over the grid, as well as at CERN itself.

Focused on the future

HGST's future at CERN looks certain to be an exciting one with over 9,000 disks set to be deployed in the facility's production clusters. The mix of enterprise, reliability, starter drives, and high-capacity-but low-RPM motors is a perfect fit for the IT facility's requirements.

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2TB - 3TB | SATA 6Gb/s



Highlights

- > Up to 3TB¹ capacity
- > CoolSpin™ technology
- > Excellent power utilisation and heat emission
- > Up to 29% power savings over 7K3000
- > Quiet acoustics
- > Built on award-winning proven design

Applications

- > Virtual Tape Libraries (VTL)
- > Disk-to-disk backup
- > Data warehousing
- > Cloud storage
- > Massive Scale Out (MSO)

¹ One GB is equal to one billion bytes and one TB equals 1,000GB (one trillion bytes) when referring to hard drive capacity. Accessible capacity will vary from the stated capacity due to formatting and partitioning of the hard drive, the computer's operating system, and other factors.

Features and Benefits

	Feature / Function	Benefits
Capacity	2TB or 3TB of storage models available	Massive enterprise capacity
Power	Advanced Power Management	Reduces power during idle periods
	HiVERT™ technology	Excellent power efficiency
	CoolSpin™ motor design	Requires low peak power enabling more cost-effective and cooler power supplies
Acoustics	Excellent acoustics	Ultra quiet operation
Reliability	Thermal Fly-height Control (TFC)	Better soft error rate for improved reliability and performance
	Head load/unload ramp	Protects disk during non-operation
	SMART Command Transport (SCT)	Adaptive error correction
	LDPC and CRC protection	Data integrity enhanced through circuits
	Internal thermal sensor	Improves data integrity