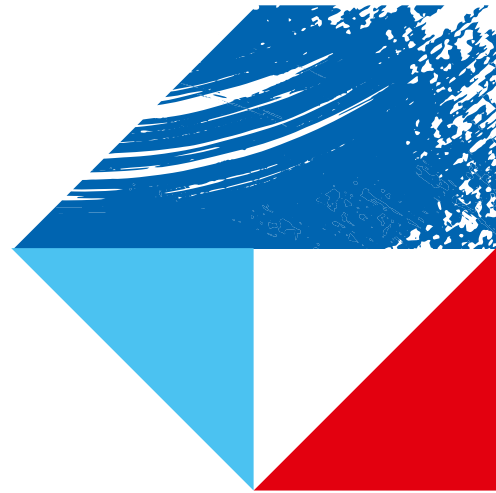


Lab Report

for Videcon „Concept Pro VUHDIP-16-3“
How do Toshiba HDDs perform in NVR environments?

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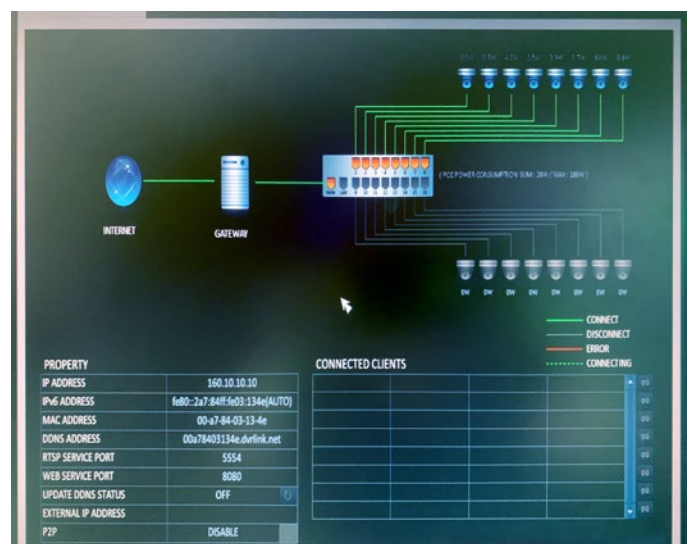


Picture 1: Concept Pro NVR in the Toshiba HDD Lab

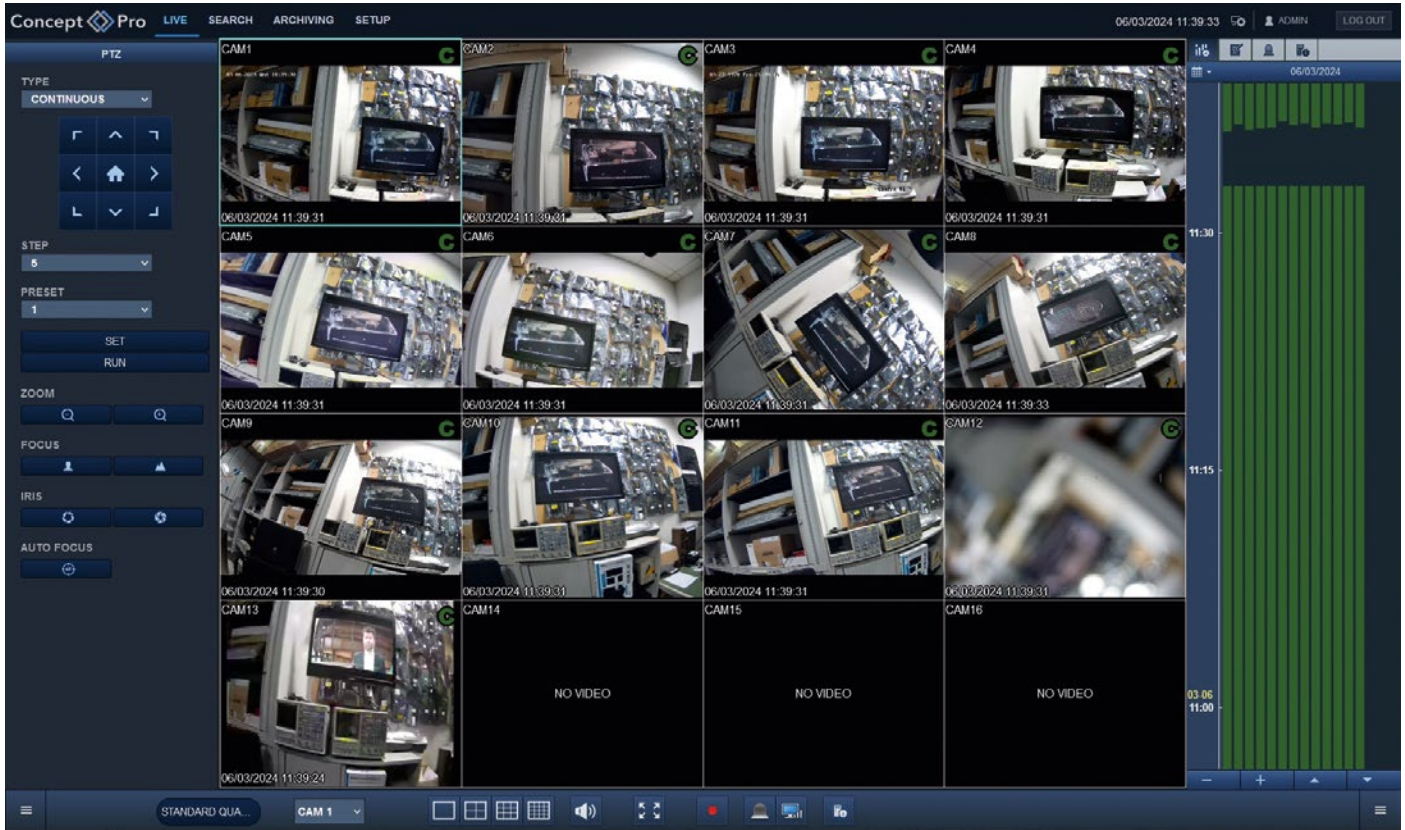
Introduction

Seamless and error-free operation 24 hours a day, 7 days a week is what customers expect when they opt for a surveillance monitoring system. Modern surveillance solutions are heavily reliant upon Network Video Recorders (NVRs) to manage and record the incoming video streams from IP cameras. To get the best results out of the data stored – in order to access it for AI driven work like face recognition, for example – it is crucial that the NVR and the storage medium inside interact flawlessly.

At Toshiba Electronics Europe GmbH (Toshiba) we asked ourselves how our Surveillance HDD line up – including the MG Series, S300 and S300 Pro – would perform inside a NVR. We wasted no time in setting up our first surveillance scenario in the Toshiba HDD laboratory to check this out. The evaluation focused on the function and performance of our different HDD models installed in a unit of the Concept Pro VUHDIP-16-3, a 16 channel NVR.



Picture 2: Concept Pro System Information



Picture 3: Concept Pro Live Stream

Methodology

The Concept Pro VUHDP-16-3 has two HDD bays, so we decided to install and operate two HDDs as one combined video storage system. We connected 13 PoE network cameras of different types and recorded 24/7 with constantly moving pictures. Such a scenario is fairly typical in larger houses, smaller businesses and home offices.

We used this setup to confirm recording and playback/searching functionality, total retention time and overwriting

functionality (for some disk models), as well as power consumption of the total unit and HDD operational temperature.

HDD models

We tested and assessed popular models of Toshiba's S300 entry level Surveillance HDD series (1TB, 2TB), as well as the S300 Pro (4TB, 10TB) and an Enterprise MG-model (18TB) for longest retention time.



Picture 5: Concept Pro with 2x S300 Pro HDD

Concept Pro LIVE SEARCH ARCHIVING SETUP 08/02/2024 13:28:27

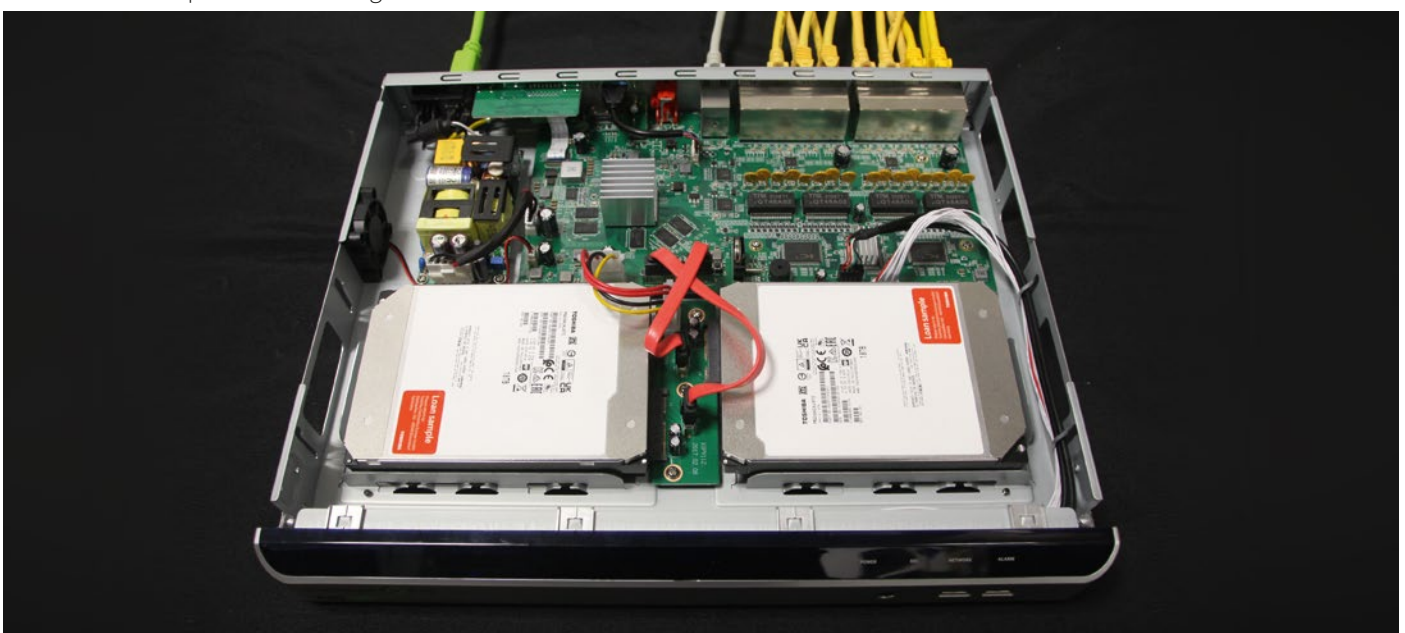
STORAGE >
DISK INFORMATION

INTERNAL

	START TIME	END TIME	STATUS	CAPACITY	MODEL	S.M.A.R.T. STATUS
ALL	16-01-2024 15:40:41	08-02-2024 13:26:46	-	-	-	-
DISK 1	16-01-2024 15:40:41	30-01-2024 21:30:02	IN USE	9.1 TB	TOSHIBA HDWT	NORMAL
DISK 2	30-01-2024 21:29:57	08-02-2024 13:26:46	IN USE	9.1 TB	TOSHIBA HDWT	NORMAL
DISK 3						
DISK 4						
DISK 5						

Navigation menu: CAMERA, DISPLAY, AUDIO, USER, NETWORK, SYSTEM, STORAGE, DISK INFORMATION, DISK OPERATIONS, S.M.A.R.T. SETUP

Picture 6: Concept Pro HDD Configuration



Picture 7: Concept Pro with 2x Enterprise MG-HDD 18TB

Conditions/Settings

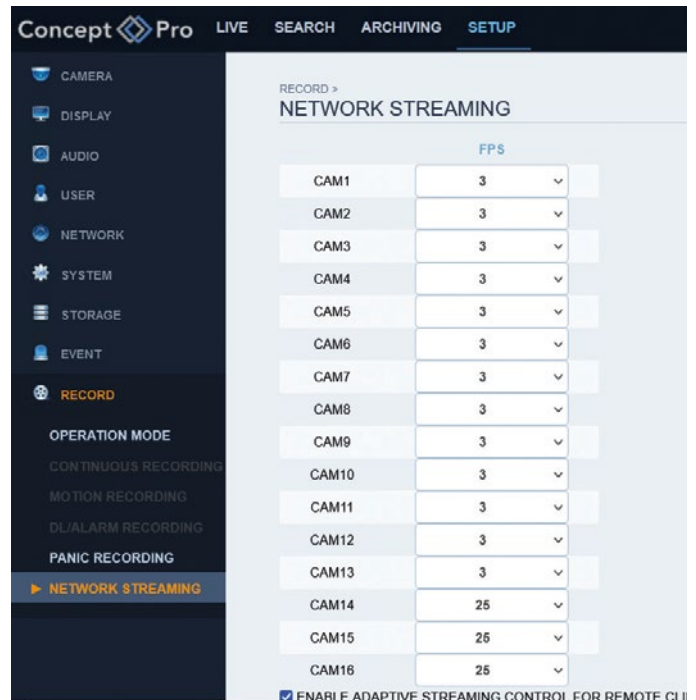
13 PoE cameras were attached, recording full motion 24/7. The setting was as follows:

- Smart storage compression: OFF
- Continuous recording
- High quality but short duration

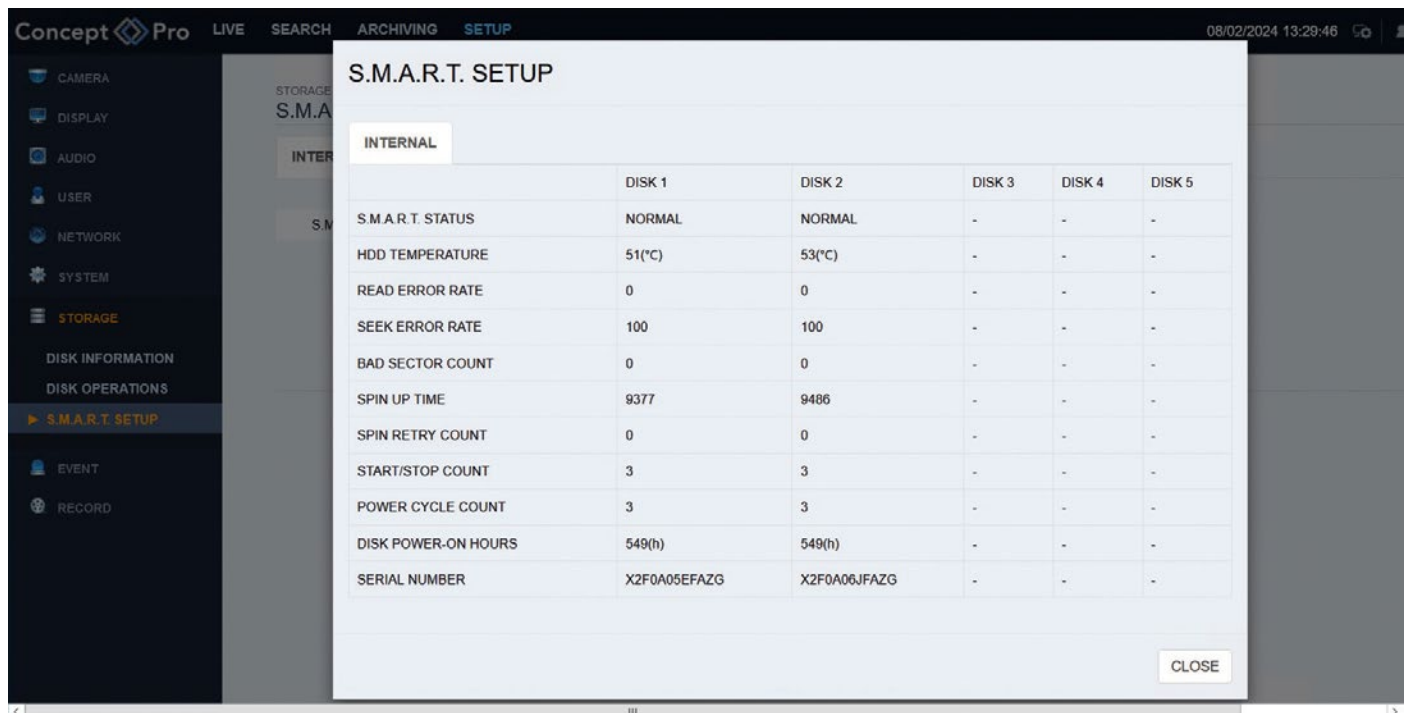
For access using the remote client (web access) we chose to optimise the performance of the NVR by configuring the network streaming frames per second (FPS) per camera (via SETUP → RECORD → NETWORK STREAMING).

The ambient temperature was 26 degC. Temperature was measured by reading out the S.M.A.R.T. parameter in the NVR GUI. (This is located under SETUP → STORAGE → S.M.A.R.T. SETUP → DETAIL INFO).

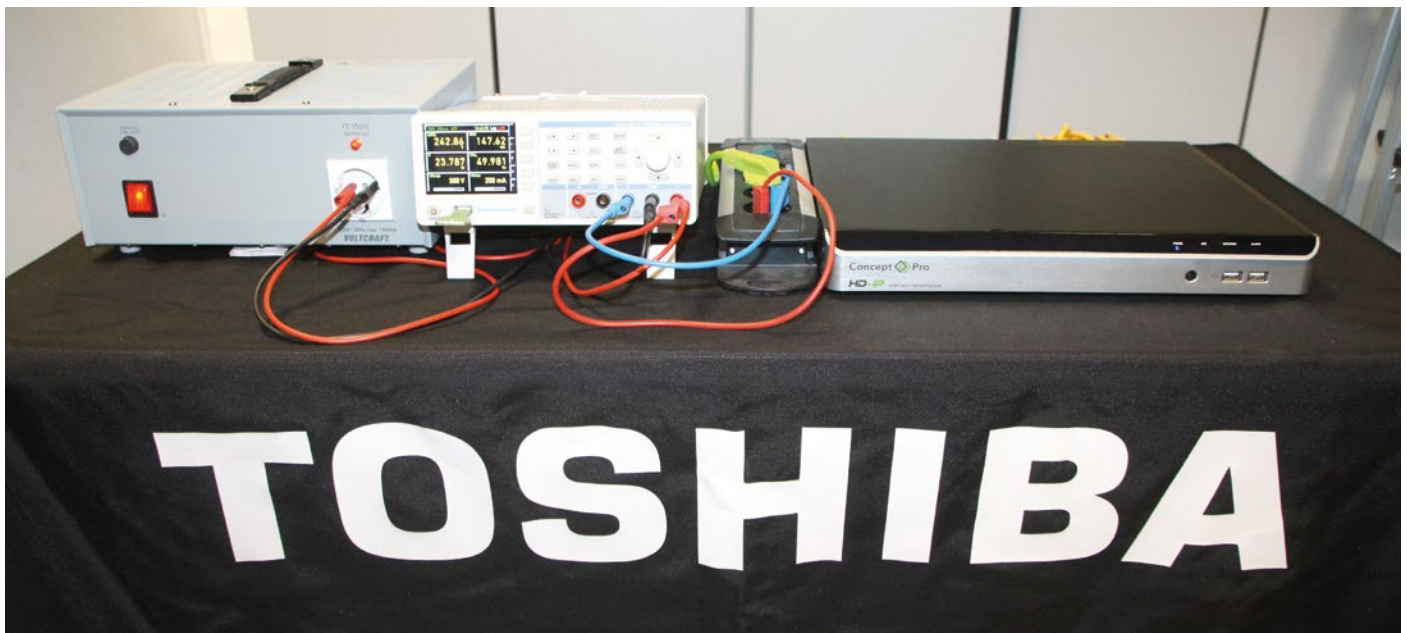
For precise measurement of the power consumption, we used a high-accuracy professional power analyzer (R&S HMC8015).



Picture 8: Concept Pro Network Streaming Setup



Picture 9: Concept Pro HDD S.M.A.R.T report



Picture 10: Setup for Power Analysis

TEST RESULTS

Power and temperature

Series		S300	S300	S300 Pro	S300 Pro	MG09
Capacity		1TB	2TB	4TB	10TB	18TB
Technology		Air-CMR	Air-SMR	Air-CMR	Air-CMR	Helium-CMR
Model name		HDWV110	HDWT720	HDWT140	HDWT31A	MG09ACA18TE
Idle (no activity)	(Watt)	25	29	28	29	25
Search (no recording)	(Watt)	26	28	30	32	28
Recording (13 cams)	(Watt)	69	69	75	80	72
Temperature active HDD	(degC)	38	37	42	53	41
Temperature idle HDD	(degC)	35	33	39	50	39

Table 1: Power and HDD Temperature Measurement Results

For the tested HDD models we can confirm that the Concept Pro VUHDIP-16-3 is compatible with all Toshiba S300, S300 Pro and Enterprise MG models.

Low values of only 25-30W is a good result for a unit in idle mode. This is also true for the maximum power of 70-80W when data is recorded.

As the maximum internal temperature rating of Toshiba HDDs is limited to 70 degC (S300/S300 Pro) or 60 degC (MG09), the measured temperatures are acceptable from a functional point

of view. However, it should be stated that average temperatures above 45 degC may have an impact on the long term reliability of an HDD. While it's still okay to use a S300 Pro 4/6/8TB, the 10TB model should be avoided. If high retention time / storage demand is needed, users are advised to consider the Enterprise models from 12TB onwards (12TB: MG07ACA12TE, 14TB: MG07ACA14TE, 16TB: MG08ACA16TE, 18TB: MG09ACA18TE, 20TB: MG10ACA20TE, 22TB: MG10AFA22TE).

The technical reason for this recommendation is that our HDDs of up to 10TB – Enterprise as well as S300/S300 Pro – are

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filled with air. Lower capacities use a lower number of platters, while the 10TB model of the S300 Pro spins a stack of seven platters. Seven platters spinning in air requires a lot of energy, resulting in a high internal power consumption which heats up the HDD. From 12TB onwards, Toshiba's Enterprise HDDs are filled with Helium. Helium is a light and homogenous gas and was introduced to reduce the fluttering of thinner platters compared to air. As a result, more of these thinner platters fit into the hard disk enclosure and higher capacities are achieved. While a platter spinning in air is exposed to rather high friction, the thinner helium gas causes much less friction. This significantly reduces the required power to spin the platter stack and results in lower power consumption and lower operating temperatures. (compare 10TB air and 18TB helium temperature results in Table 1).

Overwriting and Retention

We tested and confirmed overwriting performance for the S300 1TB, 2TB and S300 Pro 10TB. Video retention time for 13 cameras with continuous motion is ~5 days for 2x 2TB and ~30 days for 2x 10TB.

We tested CMR (conventional magnetic recording) and SMR (shingled magnetic recording) based HDDs. Both technologies work fine. Using CMR, the tracks are written with some gap in between whereas SMR overlaps the track, leaving a smaller surface for the read head. This means more tracks can be written in the same area and the storage capacity is increased using SMR compared to CMR. The de-merit of not being able to randomly overwrite smaller blocks when using SMR technology was proven to be irrelevant for the recording applications in DVR/NVR applications.

Summary

From 1-6TB S300 HDDs to 4-10TB S300 Pro and the Enterprise MG-Series, our test demonstrates that the entire lineup of

Toshiba's Surveillance hard disk drives works well with the Concept Pro VUHDIP-16-3 and that our purpose-built Surveillance Solutions are an excellent response to the growing demand for reliable security systems.

Their performance is more than adequate for recording, playback and searching. Recorded data can be accessed flawlessly and power consumption and heat dissipation are low.

We can recommend any HDD from our range for safeguarding large domestic premises, smaller businesses and home offices. However, where very long retention times are required, the helium-filled models of the MG-Series would be the best choice.

Note of thanks to our partners

We would like to thank our partner Videcon (www.videcon.co.uk) for not only providing the "Concept Pro" NVR test sample and an impressive set of surveillance cameras for the Toshiba lab testing, but also for their great assistance and cooperation in setting up and performance testing. This cooperation is an excellent example of a value chain cooperation, providing valuable guidance for Videcon and Toshiba customers on how to design a proven surveillance solution that is specifically tailored to meet the requirements of today's demanding video surveillance applications.

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