

Are Magnetic Tapes the Data Storage Medium of the Future? | Digital Trends

By Luke Dormehl December 27, 2020 : 6-7 minutes : 12/27/2020

The tech world (and let's be totally honest, tech journalists) have a recency bias — a type of cognitive skew that places greater importance on whatever is shiny and new. And the temptation is often to be awed by whatever Next Big Thing has just appeared shimmering on the horizon.

Part of this can be excused. Technology isn't like movies, music, sports stars, or any other number of areas in which recency bias can be an issue. Thanks to the exponential growth afforded by the likes of [Moore's Law](#), what's new probably seems better because, well, it *is* better.

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But sometimes, as Hollywood movies that dust off old action stars for one last hurrah are prone to remind us, the old ways still work. In some cases, far better than we might think.

A good case in point is data storage. Data is, as the saying goes, the new oil. But while that may be true of its value, it's not true of its quantity. The oil used today, to the tune of some 19 million barrels daily in the United States, was formed anywhere between tens to hundred of millions of years ago under very specific circumstances. New barrels of oil are gathered every day, but the oil in the barrels most certainly isn't new.

That's not the case with data. Each day, a reported 2.5 quintillion bytes of data is generated. An estimated 90 percent of the data that exists in the world today is believed to have been created in the last couple of years.

New technologies, such as the proliferation of Internet of Things (IoT) devices, a growing interest in data analysis, and ultra-high-definition video footage, has made us into big data hoarders. The enormous data centers built by the likes of Google are the high-tech equivalent of houses stacked high with piles of old newspapers and plastic bags of junk. By 2025, the stack of worldwide data is expected to hit 175 zettabytes (ZB). A single zettabyte is equal to a trillion gigabytes (GB).

What's the best way to store all of this? Answers on a digital postcard can range from huge racks of solid-state drives to [futuristic solutions](#) like laser-etched glass or storing data in the form of DNA. But what if the world had it right well over half a century ago? What if a solution that seemed dated long before most people got online for the first time had it right? That's what IBM has been considering by taking and dusting off digital magnetic tape, a storage medium that was first invented in 1952 with a capacity of around 2MB per reel, to be used as the method of the future. Or, at the very least, the present.

Pennies per gigabyte

"The benefits of tape start with price — pennies per gigabyte," [Robert Haas](#), department head of cloud and computing infrastructure at IBM Research Europe, told Digital Trends. "Tape is reliable. If stored properly, you can read data from tapes which are 30 years old. Tapes are also energy efficient, in that when they are at rest, they don't require any electricity unlike Flash and HDD. And, while less obvious,

tapes are very secure. Besides crypto on the tape, they can be stored with an air gap, not connected to the web, [and can even be made] quantum safe, making it future-proof.”

Haas said that, for these reasons and more, magnetic tape is currently “having a renaissance” as the medium of choice for cloud-computing storage.

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Don’t think that this is some kind of nostalgia enterprise, though. This is no hipster initiative by mustachioed, trendy, coffee-sipping IBM employees. Magnetic tape technology has improved significantly since its early days, even if it bears considerable similarities to its nearly 70-year-old ancestor. This translates into some real, tangible advantages in addition to price.

One is the quantity of data that can be stored. Unlike the 2MB reels of yesteryear, IBM’s latest magnetic tape, developed in association with Fujifilm, can store an astonishing 317GB per square inch. A single tape cartridge with this areal density, or the quantity of information bits that can be stored on a given surface area, would store approximately 580 terabytes (TB) of data.

“For some perspective, that equates to storing the text from 580 million books in the palm of your hand,” Haas said. “But we didn’t achieve this for the sake of the record. The big picture is that it means tape can continue to scale for at least a decade, if not even more. That means clients can feel confident in their investment in tape storage and to rely on it — which is remarkable considering it’s more than 60 years young.”

Environmental benefits, too

This isn’t just a storage triumph, either. It could also be an environmental one. There are, today, upward of 500 hyperscale data centers around the world. Another 151 such facilities are on the way. This means a lot of energy consumption — which could be reduced by carrying out more storage in the form of magnetic tape.

Digital magnetic tape isn’t perfect for everything, of course. “Tape is typically used for cold data or infrequently used data,” Haas explained. “Examples could be financial records, clinical trials, or, as in the case of CERN, the results of smashing particles together in the [Large Hadron Collider.]”

Spools of magnetic tape aren’t going to be making a mass comeback any time soon. You won’t ditch your solid-state disk drive for tape cartridges. But work like this shows that, while your average consumer may have moved on, research is still going on in these areas. And since cloud storage means the end user doesn’t have to be aware of exactly how their data is stored, you might find yourself relying on magnetic tape without even realizing it.

Next, I’d like to see how much the modern 3.5mm floppy disk can store. It was 1.44MB last time I used one, so I’m expecting something considerably more impressive two decades on!