HDD/SSD supply chain

HDD and SSD market seminar report

On September 2, we invited Mr. Kengo Ota of Techno Systems Research (TSR) to give a presentation at our seminar on the outlook for the HDD and SSD market. The main topics included HDD market trends, technology roadmaps of HDD manufacturers, and supply/demand trends for major components. We provide an overview of the seminar below and summarize the implications for Japan's technology sector.

Japan Equity Research

Technology - Electronic Components

Akinori Kanemoto AC
(81-3) 6736 8628
akinori.kanemoto@jpmorgan.com

Ikki Shibata
(81-3) 6736 8641
ikki.shibata@jpmorgan.com

Technology - Consumer Electronics/ Industrial Electronics/Precisions

Junya Ayada AC
(81-3) 6736 8631
junya.ayada@jpmorgan.com

Technology - Semiconductor/ Technical Materials

Mio Shikanai AC
(81-3) 6736 1313
mio.shikanai@jpmorgan.com
JPMorgan Securities Japan Co., Ltd.

Our view

- **Implications for the electronic components sector:** According to TSR, TDK began supplying HDD heads to captive manufacturers in 1Q 2026, but at present, the company is mainly supplementing insufficient in-house production capacity at captive manufacturers in existing volume zones, such as energy-assisted perpendicular magnetic recording (ePMR) drives. Regarding component prices, Kengo Ota commented that there is room for price increases of around 5-10% for heads, but price increases above 10% are unlikely to be accepted by the manufacturers. Although supply-demand conditions for HDD suspensions are tight, drive makers still have influence over prices. Although there is room for TDK to expand its share of the market due to the insufficient in-house production capacity at two US HDD companies, it is unclear how far TDK can penetrate the HAMR market, as these two companies are likely to prioritize in-house production. In contrast, Toshiba's shipments look likely to expand as it shifts capacity to nearline HDDs. We expect earnings to expand in TDK's HDD head business on growth in shipments to captive manufacturers, an increase in shipments of nearline HDD heads to Toshiba, and price hikes in response to tight supply/demand conditions for heads. We view the adoption of Western Digital's (WDC's) dual pivot technology as positive for MinebeaMitsumi, but we think the impact on its consolidated earnings will be limited.
- **Implications for semiconductor and tech materials sector:** The outlook for nearline HDD demand has improved, and the latest TSR estimate is for bit growth of 22% (from 1,415 exabytes (EB) in 2025 to 3,900EB in 2030). TSR noted that further upside is gated by production capacity on the HDD side. In addition, the difference in bit cost between SSDs and HDDs was 6-7x in 2025, but TSR expects this to widen to around 15x in 2026 (however, both SSD and HDD prices rose YoY due to a sharp increase in demand). With memory storage demand soaring for inference AI applications, NAND flash memory maker Kioxia is strengthening its offerings for triple-level cell (TLC) NAND. We expect the pace of growth in sales of quad-level cell (QLC) NAND, which was poised to replace HDDs, to be more moderate than previously anticipated. With the price gap between SSDs and HDDs widening, it may take some time for QLC NAND to replace HDDs. For HOYA, the biggest focus is the level of glass adoption at Toshiba and Western Digital, in addition to Seagate (STX). It is reassuring that, according to TSR, Western Digital is likely to start production of such HDDs in small volumes in 2027 and mass production (millions of units per quarter) from 2028. In addition, we do not expect any revisions to glass substrate prices in the short term, as the difference between HAMR and non-HAMR HDDs is currently negligible or non-existent. However, we also take

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note of TSR's comment about the possibility of an increase in prices as the technology advances.

- **Implications for consumer electronics sector:** Regarding the demand outlook for HAMR, TSR forecasts for Seagate around 9 million/year units in 2026, 16-17 million units/year in 2027, and 25 million units/year in 2028, while for WDC it forecasts 1 million units/quarter in 2028 at the earliest, and 4-5 million units/year in 2029 as a more realistic scenario. Seagate remains an important customer for Sony, which supplies semiconductor lasers for HAMR HDDs, but Seagate manufactures semiconductor lasers in-house and also sources them from Sony. Sony's share of the market seems to be currently around 60%. Depending on production plans and yields, Seagate may increase its in-house production ratio and reduce its reliance on Sony. We estimate that Sony's sales will be in the tens of billions of yen in 2028 if it maintains its current market share, and we think further growth in HAMR demand, including mass production by Western Digital from 2029 onward, will make a substantial contribution to profits.

The seminar overview

- **HDD market trends:** (1) The main points of discussion regarding the HDD market in 2026 were expansion of total shipped capacity (EB) and average capacity, rather than shipment volume. In particular, nearline HDD capacity has increased, and ASP and sales have risen from 2025 to 2026 along with this. (2) In 2026, sales have grown significantly more than capacity growth, creating an environment where companies can easily make a profit in terms of unit prices. The underlying reason is an overall shortage of storage supply, and as companies concentrate their resources on nearline HDDs, unit prices are rising by about 10-15% even for the same product. (3) In terms of shipment volume, the growth rate of nearline HDDs has accelerated since 3Q 2025, and they now account for 60% of the entire HDD market. On the other hand, enterprise HDDs are declining as they are replaced by SSDs. There was a temporary recovery in 2025 in 3.5-inch HDDs, mainly for desktop PCs and surveillance cameras, on the back of a shortage of SSDs. These HDDs are also expected to rise in 2026, but then only grow to a limited extent from 2027 onward. The decline in 2.5-inch HDDs continues due to a shift to SSDs in laptops.
- **2Q 2026 (April-June):** (1) In 2Q results, HDD shipments were flat QoQ, but sales and profits of each drive manufacturer improved on the back of an increase in ASP. Growth in nearline-HDD ASP was the main contributor. (2) On the production side, as of 2Q, output slightly exceeded shipments, and the supply-demand balance was favorable.
- **Outlook:** (1) Nearline HDDs are still doing well, and sales are expected to continue to expand this year thanks to ASP growth. However, the pace of ASP growth is expected to gradually slow through 3Q and 4Q, based on the price tolerances of buyers such as hyperscalers. The outlook for nearline-HDD demand is improving, and the latest TSR forecast is for bit growth of 22% (from 1,415EB in 2025 to 3,900EB in 2030). Further upside will apparently depend on the production capacity of HDD manufacturers and HDD component manufacturers. (2) Western Digital and Seagate are shifting to nearline HDDs while reducing other form factors, and Toshiba is also making progress in shifting its capabilities toward nearline, although it is lagging slightly in terms of volume. The outlook is for solid growth in 3Q and beyond. (3) Nearline-HDD shipments are expected to grow to 77 million units in 2026 and 80 million units in 2027. However, TSR believes drive and component capacity is approaching the upper limit, and that the full effect of component manufacturers' capacity ramp-ups will not become apparent until 2028 or later. Therefore, it commented that shipments are unlikely to increase significantly in 2027 and 2028.
- **Per-GB cost difference between HDDs and SSDs:** (1) Up until 2025, the per-GB cost of SSDs was falling, and the per-GB cost of HDDs was also decreasing gradually. In 2026,

however, the cost gap has widened significantly due to the sharp rise in SSD prices. TSR forecasts that the 2026 per-GB cost of HDDs will be US$0.0160 and of SSDs US$0.2434, resulting in a difference of about 15x overall. (2) When comparing enterprise SSDs and nearline HDDs, the storage per-GB cost gap has widened to around 20x, further strengthening the cost advantage of HDDs. (3) The per-GB cost of enterprise SSDs is expected to remain high until at least mid-2027, and although it might decline as capacity increases thereafter, the cost gap with nearline HDDs will likely continue to be large for the next few years.

- **HDD technology roadmap:** (1) While capacity per platter has increased relatively steadily so far, the pace of improvement in areal recording density has slowed somewhat recently. The key going forward will be whether to increase the number of platters or further increase areal recording density using HAMR/MAMR. (2) STX is leading in HAMR, and plans to transition from Marlin (10D, 28-30TB, HAMR)/Marlin BP (10D, 32-36TB, HAMR) to Dorado (10D, 40-44TB, HAMR). However, the current volume of data will be supported by conventional Summit drives (He, 10D, 24-28TB), and the focus is on how smoothly the transition to HAMR can be achieved. TSR forecasts that STX's HAMR will reach 9 million units/year in 2026, 16-17 million units/year in 2027, and 25 million units/year in 2028. (3) WDC's core technology is ePMR-based Sydney-E (CMR/SMR, 11D, 26-32TB). In 2027, Madrid (CMR/SMR, 12D, 40TB, ePMR) is expected to enter full-scale mass production, while Roma (CMR, 14D, 50TB-), which utilizes Dual Pivot technology, is expected to take off from the latter half of 2027 to 2028. Meanwhile, HAMR will be deployed in Helsinki (10D, 26TB-, HAMR) and St. Moritz (11D, 44TB-, HAMR), but TSR expects full-fledged mass production to begin in 2028 or later. WDC's HAMR is projected to reach 1 million units/quarter as early as 2028, and more realistically, 4-5 million units/year by 2029. (4) Toshiba was slightly behind in terms of capacity compared to the two US companies, but it plans to move on to M-12 (11D, 28-34TB, MAMR) and then to deploy M-13 (12D, MAMR) and T Series (HAMR). The full-scale launch of HAMR is expected around 2029.
- **HDD component-related:** (1) The spindle motor market is dominated by two companies: NIDEC and MinebeaMitsumi. There have been no significant changes in shipment destinations or volumes, with trends basically following the number of HDDs sold. (2) With STX's and WDC's in-house production capacity for heads and media becoming tight, they have expanded the use of external suppliers such as TDK for heads and Resonac for media. TDK is seeing increased volumes for STX's Summit (He, 10D, 24-28TB Glass), WDC's Sydney-E (CMR/SMR, 11D, 26-32TB, ePMR), as well as for Toshiba, and looks set to continue supplying them in 3Q. (3) TDK's head component supply is currently mainly positioned as a stopgap measure, given the shortfalls at the two US-based companies. While there is room for expansion into HAMR in the future, STX is strongly inclined to manufacture as much of its technology in-house as possible, as the head and laser are integrated in HAMR. TDK's shipments to STX increased to 6 million units in April-June 2026, and are expected to rise to 10 million units in January-March 2027, although they might level off thereafter. WDC has adopted TDK heads in Sydney-E, and approval of these heads for Sydney-F is pending. However, WDC seems to be adopting TDK's heads at a somewhat slower pace than STX. (4) With regard to the current price of components, there is room for price increases of around 5-10% in head prices, but price increases above 10% are unlikely to be accepted. The supply-demand balance for suspensions is also tight, and while there is some room for negotiation due to a shortage of components, there has yet to be any strong move toward revising prices. Negotiation terms vary by product and generation, but overall, drive manufacturers have the upper hand, and it was noted that it is unlikely that prices will rise to a degree that will greatly boost the profitability of component manufacturers.

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