

8. INDUSTRY OVERVIEW

The Data Storage Industry's Most Trusted Market Intelligence

27 JAN 2010

The Board of Directors
JCY International Berhad
Level 7 Menara Milenium
Jalan Damanlela
Pusat Bandar Damansara
50490 Kuala Lumpur
Malaysia

Dear Sirs

INDEPENDENT MARKET RESEARCH REPORT ON THE HARD DISK DRIVE ("HDD") AND HDD COMPONENT INDUSTRY

We, TRENDFOCUS, Inc. ("TRENDFOCUS"), have prepared the Independent Market Research report on the HDD and HDD component industry ("**Report**") for inclusion in JCY's prospectus ("**Prospectus**") in relation to the initial public offering and the listing of and quotation for the entire issued and paid-up share capital of JCY on the Main Market of Bursa Malaysia Securities Berhad.

We are aware that this Report will be included in the Prospectus and we further confirm that we are aware of our responsibilities under Section 214 of the Capital Market and Services Act, 2007.

This research is undertaken with the purpose of providing an overview of the HDD and HDD component industry.

We acknowledge that if we are aware of any significant changes affecting the content of this Report between the date hereof and the issue date of the Prospectus, we have an on-going obligation to cause this Report to be updated for the changes.

TRENDFOCUS has prepared this report in an independent and objective manner and has taken adequate care to ensure the accuracy and completeness of the report. We believe that this report presents a true and fair view of the industry within limitations of amongst others, our primary and secondary research. We are not responsible for the decisions and/or actions of the readers of this report. This report should also not be considered as a recommendation to buy or not to buy the shares of any company or companies.

For and on behalf of TRENDFOCUS, Inc



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HDD INDUSTRY OVERVIEW

Hard disk drives ("HDDs") have, for more than 50 years, provided the most cost-effective mass storage of data and digital content such as photos, music, and video. Despite challenges from alternative technologies such as solid-state drives ("SSDs"), HDDs account for more than 95% of the devices used in personal computers (including netbooks), digital video recorders ("DVRs"), digital video cameras ("DVCs"), and game consoles.

The competitive landscape has changed since the industry's infancy. As recently as the 1990s, more than 20 HDD manufacturers battled for market share as the popularity of PCs and the proliferation of digital content drove demand for storage. However, due to consolidation in the industry, only five key players now remain.

A number of factors affect total HDD unit shipments in any given quarter. On the supply side, the cost and availability of raw materials for HDD components, supply of the components themselves, and factory production capacities determine the number of HDDs that manufacturers can build. The demand picture, on the other hand, is painted by both consumers and corporations, as HDDs ship into the desktop and mobile PC segment, enterprise applications such as servers and storage arrays, and consumer electronics products including digital video recorders, game consoles, and digital video cameras.

With macroeconomic conditions deteriorating rapidly in the second half of 2008, the HDD industry was hit hard in the last quarter of the year. Fortunately for the industry, the first three quarters of 2009 showed demand expansion, and the fourth quarter is forecast to be higher still. An increase in PC demand, especially for mobile computing solutions, and an upturn in the global economy are to credit, with 2010 expected to see further growth as business spending and consumer sentiment improve further.

The tables below show the historical and estimated unit shipments and revenue of the Global HDD market.

Global HDD Unit Shipments, by Form Factor (M)

	2005	2006	2007	2008	2009e*	2010e*	2011e*	2012e*	CAGR**
3.5"	265.12	284.88	306.98	298.05	276.95	272.06	261.55	248.40	-0.9%
%	14.4%	7.5%	7.8%	-2.9%	-7.1%	-1.8%	-3.9%	-5.0%	
2.5"	83.65	122.01	173.18	222.97	267.90	345.36	427.45	518.20	29.8%
%	48.2%	45.9%	41.9%	28.8%	20.2%	28.9%	23.8%	21.2%	
<=1.8"	31.21	28.56	21.72	19.26	10.75	7.39	5.65	4.70	-23.7%
%	83.6%	-8.5%	-23.9%	-11.3%	-44.2%	-31.3%	-23.5%	-16.8%	
Total	379.98	435.45	501.88	540.28	555.60	624.81	694.65	771.30	10.6%
%	24.4%	14.6%	15.3%	7.7%	2.8%	12.5%	11.2%	11.0%	

Source: TRENDFOCUS, November 2009

*Estimated

**Compound Annual Growth Rate, 2005-2012

Global HDD Revenue, by Form Factor (US\$M)

	2005	2006	2007	2008	2009e*	2010e*	2011e*	2012e*	CAGR**
3.5"	\$19,205	\$21,088	\$20,856	\$19,594	\$16,425	\$16,074	\$14,436	\$13,572	-4.8%
%	8.9%	9.8%	-1.1%	-6.1%	-16.2%	-2.1%	-10.2%	-6.0%	
2.5"	\$6,304	\$7,796	\$11,220	\$13,720	\$14,151	\$16,413	\$20,027	\$23,827	20.9%
%	35.6%	23.7%	43.9%	22.3%	3.1%	16.0%	22.0%	19.0%	
<=1.8"	\$2,602	\$1,996	\$1,330	\$1,114	\$566	\$384	\$299	\$245	-28.6%
%	83.2%	-23.3%	-33.4%	-16.2%	-49.2%	-32.2%	-22.0%	-18.0%	
Total	\$28,111	\$30,880	\$33,406	\$34,428	\$31,142	\$32,871	\$34,763	\$37,644	4.3%
%	18.6%	9.9%	8.2%	3.1%	-9.5%	5.6%	5.8%	8.3%	

Source: TRENDFOCUS, November 2009

*Estimated

**Compound Annual Growth Rate, 2005-2012

8. INDUSTRY OVERVIEW (cont'd)

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Manufacturers	Capacity by Size	CQ3 '09 Shipments	CQ3 '09 Production Capacity	Projected CQ4 '09 Production Capacity	Projected CQ3 '10 Production Capacity	Change
Seagate Technology (Seagate)	2.5", 1.8", 1.0", 0.85" Mobile and CE	14.60	15.00	15.00	21.00	
	3.5" Desktop and CE	27.69	31.00	31.00	28.00	
	3.5", 2.5" Enterprise	3.98	6.00	6.00	6.00	
	Total	46.27	52.00	52.00	55.00	5.8%
Western Digital Corporation (WDC)	2.5", 1.8", 1.0", 0.85" Mobile and CE	19.31	24.00	24.00	26.00	
	3.5" Desktop and CE	24.74	25.00	25.00	24.00	
	3.5", 2.5" Enterprise	---	---	1.00	1.00	
	Total	44.05	49.00	50.00	51.00	2.0%
Hitachi Global Storage Technologies (HGST)	2.5", 1.8", 1.0", 0.85" Mobile and CE	15.09	16.00	16.00	18.00	
	3.5" Desktop and CE	8.43	11.00	11.00	10.00	
	3.5", 2.5" Enterprise	1.50	2.00	2.00	2.00	
	Total	25.02	29.00	29.00	30.00	3.4%
Toshiba	2.5", 1.8", 1.0", 0.85" Mobile and CE	21.26	26.00	26.00	26.00	
	3.5" Desktop and CE	---	---	---	---	
	3.5", 2.5" Enterprise	1.16	3.00	3.00	3.00	
	Total	22.42	29.00	29.00	29.00	0.0%
Samsung	2.5", 1.8", 1.0", 0.85" Mobile and CE	6.62	7.00	7.00	8.00	
	3.5" Desktop and CE	7.92	8.50	8.50	8.00	
	3.5", 2.5" Enterprise	---	---	---	---	
	Total	14.54	15.50	15.50	16.00	3.2%
Totals	2.5", 1.8", 1.0", 0.85" Mobile and CE	76.88	88.00	88.00	99.00	
	3.5" Desktop and CE	68.78	75.50	75.50	70.00	
	3.5", 2.5" Enterprise	6.64	11.00	12.00	12.00	
	Total	152.30	174.50	175.50	181.00	3.1%

Source: TRENDFOCUS, November 2009

Note: Toshiba acquired Fujitsu's HDD business, comprising 2.5" mobile and 2.5" and 3.5" enterprise HDDs in October 2009.

The table above presents the latest production capacity for the five HDD manufacturers in the third quarter of 2009. With demand growth driven primarily by PC and server demand, along with strong contribution from the consumer electronics markets, it is likely that 2010 will see additional manufacturing capacity investment by the HDD manufacturers.

The following tables show historical market shares and unit shipments for the five remaining HDD manufacturers. "Others" ceased being statistically significant in 2007 due to supplier consolidation.

Global Market Share, by HDD Supplier**HDD Supplier Market Shares**

	2005	2006	2007	2008	CQ1 '09	CQ2 '09	CQ3 '09
Seagate	28.3%	32.0%	35.0%	31.5%	34.1%	30.9%	30.4%
WD	17.4%	19.6%	22.5%	26.8%	27.5%	30.4%	28.9%
HGST	15.3%	16.1%	17.8%	16.9%	17.0%	16.9%	16.4%
Toshiba	15.2%	15.9%	14.7%	16.0%	11.8%	13.2%	14.7%
Samsung	8.7%	10.9%	9.5%	8.2%	8.8%	8.6%	9.5%
Others	15.1%	5.5%	0.5%	0.6%	0.8%	---	---
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: TRENDFOCUS, November 2009

Note: Toshiba acquired Fujitsu's HDD business, comprising 2.5" mobile and 2.5" and 3.5" enterprise HDDs in October 2009.

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3.5" HDD Unit Shipments, by Supplier (M)

	2005	2006	2007	2008	2009e*	CAGR**
ExcelStor	2.88	2.68	2.82	3.90	0.90	-25.2%
Seagate	91.58	111.40	134.53	129.71	115.55	6.0%
WDC	62.88	77.37	90.74	94.26	94.53	10.7%
HGST	22.86	30.80	41.92	40.46	37.13	12.9%
Samsung	26.98	37.02	32.17	26.12	28.28	1.2%
Toshiba	5.27	5.37	4.80	3.60	1.46	-27.5%
Total	209.57	261.96	304.16	294.15	276.95	7.2%

Source: TRENDFOCUS, November 2009

*Estimated

**Compound Annual Growth Rate, 2005-2012

2.5" HDD Unit Shipments, by Supplier (M)

	2005	2006	2007	2008	2009e*	CAGR**
WDC	3.35	7.84	22.15	50.37	67.28	111.7%
Toshiba	37.57	44.02	55.86	70.10	66.97	15.5%
Seagate	10.06	26.12	40.58	40.10	57.88	54.9%
HGST	26.24	33.40	44.22	50.65	55.50	20.6%
Samsung	6.11	10.64	10.37	11.75	20.27	35.0%
Total	83.33	122.02	173.18	222.97	267.90	33.9%

Source: TRENDFOCUS, November 2009

*Estimated

**Compound Annual Growth Rate, 2005-2012

1.8" HDD Unit Shipments, by Supplier (M)

	2005	2006	2007	2008	2009e*	CAGR**
Toshiba	15.34	19.92	12.75	12.36	7.46	-16.5%
Samsung	---	---	5.28	6.22	2.87	---
Seagate	6.27	1.77	0.43	0.68	---	---
HGST	9.41	5.81	3.24	---	---	---
WDC	---	0.02	0.02	---	---	---
Total	31.02	27.52	21.72	19.26	10.33	-24.0%

Source: TRENDFOCUS, November 2009

*Estimated

**Compound Annual Growth Rate, 2005-2012

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RECENT DEVELOPMENTS, GROWTH CATALYSTS

Stabilisation of ASPs

The stability of HDD prices is an indicator of the financial health of the HDD and components industry. Average selling prices ("ASPs") have stabilised in recent quarters as the tight supply has helped moderate the traditionally perpetual pricing takedowns seen within the industry. This trend is expected to continue into 2010, and HDD manufacturers may benefit via increased revenues and higher gross margins. However, HDD factories are operating at historically high utilisation rates and with demand expected to grow due to the aforementioned reasons, in 2010, HDD manufacturers are expected to begin to increase capital expenditure budgets to expand manufacturing capacities.

As observed in the tables below, ASP erosion has been slowing from 2006 to the present, indicating that prices are stabilising. The declining rate of ASP erosion signals both a financially stable industry and less price pressure on component makers.

3.5" Desktop & CE OEM HDD Pricing, by Capacity Range (US\$M)

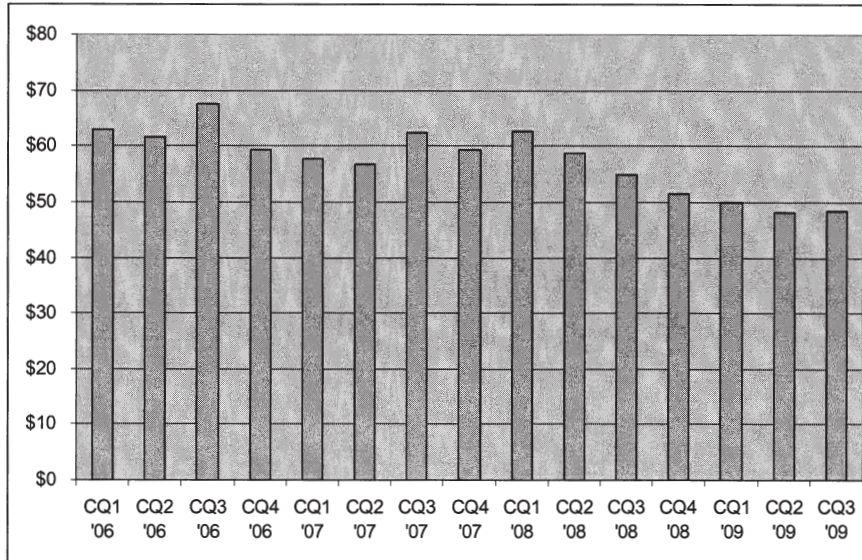
	CQ1 '06	CQ2 '06	CQ3 '06	CQ4 '06	CQ1 '07	CQ2 '07	CQ3 '07	CQ4 '07	CQ1 '08	CQ2 '08	CQ3 '08	CQ4 '08	CQ1 '09	CQ2 '09	CQ3 '09
	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals
40.0-59.9 GB	\$41	\$40	\$40	\$39	---	---	---	---	---	---	---	---	---	---	---
%	0.0%	-2.4%	0.0%	-2.5%											
60.0-79.9 GB	\$42	\$41	\$41	\$40	---	---	---	---	---	---	---	---	---	---	---
%	0.0%	-2.4%	0.0%	-2.4%											
<80.0 GB	---	---	---	---	\$39	\$38	\$38	\$38	\$37	\$37	\$37	\$35	\$33	\$33	\$33
%					-2.6%	0.0%	0.0%	-2.6%	0.0%	0.0%	-5.4%	-5.7%	0.0%	0.0%	0.0%
80.0-99.9 GB	\$48	\$45	\$44	\$42	\$41	\$40	\$40	\$40	\$38	\$38	\$38	\$36	\$34	\$34	\$34
%	2.1%	-6.3%	-2.2%	-4.5%	-2.4%	-2.4%	0.0%	0.0%	-5.0%	0.0%	0.0%	-5.3%	-5.6%	0.0%	0.0%
100.0-149.9 GB	\$58	\$55	\$52	\$50	\$48	\$48	\$45	\$45	\$43	\$41	\$40	\$37	\$36	\$35	\$35
%	0.0%	-5.2%	-5.5%	-3.8%	-4.0%	0.0%	-6.3%	0.0%	-4.4%	-4.7%	-2.4%	-7.5%	-4.1%	-1.4%	0.0%
150.0-199.9 GB	\$68	\$64	\$60	\$56	\$53	\$51	\$48	\$47	\$44	\$42	\$41	\$38	\$36	\$36	\$35
%	-2.9%	-5.9%	-6.3%	-6.7%	-5.4%	-3.8%	-5.9%	-2.1%	-6.4%	-4.5%	-2.4%	-7.3%	-5.3%	0.0%	-2.8%
200.0-299.9 GB	\$88	\$81	\$75	\$69	\$65	\$63	\$60	\$59	\$55	\$48	\$43	\$40	\$39	\$38	\$38
%	-2.2%	-8.0%	-7.4%	-8.0%	-5.8%	-3.1%	-4.8%	-1.7%	-6.8%	-12.7%	-10.4%	-7.0%	-2.5%	-2.6%	0.0%
300.0-399.9 GB	\$110	\$101	\$94	\$88	\$80	\$78	\$74	\$70	\$64	\$59	\$53	\$48	\$45	\$42	\$40
%	-21.4%	-8.2%	-6.9%	-6.4%	-9.1%	-2.5%	-5.1%	-5.4%	-8.6%	-7.8%	-10.2%	-9.4%	-6.3%	-8.7%	-4.8%
400.0-499.9 GB	\$165	\$155	\$140	\$125	\$115	\$110	\$102	\$98	\$90	\$69	\$58	\$50	\$49	\$47	\$45
%		-8.1%	-9.7%	-10.7%	-8.0%	-4.3%	-7.3%	-3.9%	-8.2%	-23.3%	-15.9%	-13.8%	-2.0%	-4.1%	-4.3%
500.0-699.9 GB	\$215	\$200	\$185	\$150	\$135	\$130	\$124	\$116	\$99	\$75	\$63	\$54	\$53	\$51	\$48
%		-7.0%	-7.5%	-18.9%	-10.0%	-3.7%	-4.6%	-6.5%	-14.7%	-24.2%	-16.0%	-14.3%	-1.9%	-3.8%	-5.9%
700.0-999.9 GB	---	---	\$200	\$200	\$190	\$180	\$173	\$170	\$152	\$125	\$90	\$80	\$69	\$64	\$60
%			0.0%	0.0%	-5.0%	-5.3%	-3.9%	-1.7%	-10.8%	-17.8%	-28.0%	-11.1%	-13.8%	-7.2%	-6.3%
1.00-1.99 TB	---	---	---	---	\$325	\$320	\$295	\$285	\$248	\$190	\$120	\$98	\$94	\$86	\$80
%					-1.5%	-7.8%	-3.4%	-3.4%	-13.0%	-23.4%	-36.8%	-18.3%	-4.1%	-8.5%	-7.0%
2.00-2.99 TB	---	---	---	---	---	---	---	---	---	---	---	---	---	\$225	\$205
%														-8.9%	
Avg. Price	\$63	\$62	\$68	\$59	\$58	\$57	\$62	\$59	\$63	\$59	\$55	\$52	\$50	\$48	\$48
Avg. Capacity (GB)	134	140	151	162	184	198	231	247	279	293	329	395	391	438	483

Source: TRENDFOCUS, November 2009

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3.5" Desktop & CE OEM Average HDD Pricing (US\$M)



Source: TRENDFOCUS, November 2009

2.5" Mobile & CE OEM HDD Pricing, by Capacity Range (US\$M)

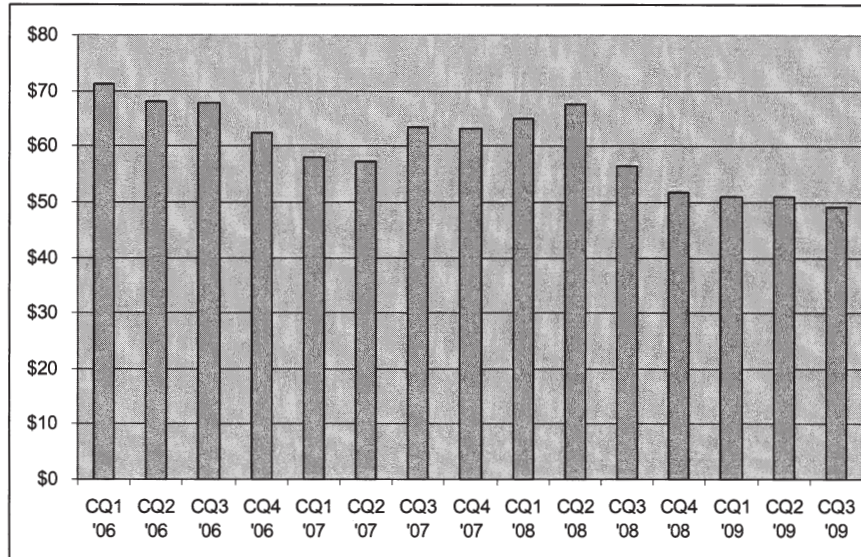
	CQ1 '06	CQ2 '06	CQ3 '06	CQ4 '06	CQ1 '07	CQ2 '07	CQ3 '07	CQ4 '07	CQ1 '08	CQ2 '08	CQ3 '08	CQ4 '08	CQ1 '09	CQ2 '09	CQ3 '09
	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals	Actuals
20.0-29.9 GB	\$49														
%	-2.0%														
30.0-39.9 GB	\$52	\$51	\$48	\$44											
%	2.0%	-1.9%	-5.9%	-8.3%											
40.0-59.9 GB	\$55	\$52	\$50	\$46											
%	3.8%	-5.5%	-3.8%	-8.0%											
60.0-79.9 GB	\$63	\$61	\$58	\$52											
%	-6.0%	-3.2%	-4.9%	-10.3%											
<80.0 GB					\$47	\$45	\$44	\$44	\$42	\$41	\$40	\$38	\$38	\$37	\$37
%						-4.3%	-2.2%	0.0%	-4.5%	-2.4%	-2.4%	-5.0%	-1.3%	-1.3%	0.0%
80.0-99.9 GB	\$75	\$71	\$65	\$60	\$56	\$54	\$52	\$50	\$46	\$43	\$41	\$39	\$38	\$38	\$37
%	2.7%	-5.3%	-8.5%	-7.7%	-6.7%	-3.6%	-3.7%	-3.8%	-8.0%	-6.5%	-4.7%	-4.9%	-2.6%	0.0%	-2.6%
100.0-149.9 GB	\$103	\$95	\$88	\$78	\$71	\$67	\$63	\$61	\$56	\$50	\$43	\$40	\$39	\$38	\$38
%	-1.9%	-7.8%	-7.4%	-11.4%	-9.0%	-5.6%	-6.0%	-3.2%	-8.2%	-10.7%	-14.0%	-7.0%	-2.5%	-2.6%	0.0%
150.0-199.9 GB	\$130	\$118	\$105	\$93	\$85	\$80	\$76	\$72	\$64	\$55	\$45	\$42	\$40	\$39	\$38
%		-9.2%	-11.0%	-11.4%	-8.6%	-5.9%	-5.0%	-5.3%	-11.1%	-14.1%	-18.2%	-6.7%	-4.8%	-2.5%	-2.6%
200.0-299.9 GB			\$150	\$130	\$118	\$112	\$110	\$105	\$91	\$79	\$63	\$53	\$51	\$48	\$46
%				-13.3%	-9.2%	-5.1%	-1.8%	-4.5%	-13.3%	-13.2%	-20.3%	-15.9%	-3.8%	-5.9%	-4.2%
300.0-399.9 GB								\$175	\$150	\$110	\$85	\$65	\$59	\$54	\$52
%									-14.3%	-26.7%	-22.7%	-23.5%	-9.2%	-8.5%	-3.7%
400.0-499.9 GB															\$67
%															
500.0-699.9 GB											\$125	\$110	\$100	\$88	\$80
%												-12.0%	-9.1%	-12.0%	-9.1%
Avg. Price	\$71	\$68	\$68	\$62	\$58	\$57	\$63	\$63	\$65	\$68	\$57	\$52	\$51	\$51	\$49
Avg. Capacity (GB)	69	71	74	80	96	106	124	143	153	173	201	223	239	251	281

Source: TRENDFOCUS, November 2009

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2.5" Mobile & CE OEM Average HDD Pricing (US\$M)



Source: TRENDFOCUS, November 2009

Digitisation of Media, Growth of Consumer Electronics Segment

The Consumer Electronics ("CE") segment of the HDD market has more than doubled in size since 2004 on a unit basis, with 81 million drives going into CE products in 2008. The digitisation of media has helped fuel demand for products such as digital video recorders and portable media players, while game consoles, digital video cameras, and auto navigation systems have also contributed to growth in the segment. Although CE, like other market segments, is recovering from the global economic crisis, it is affected the most by the seasonality of sales (back-to-school and holiday shopping patterns) in the second half of the calendar year.

CE HDD Unit Shipments, by Form Factor (M)

	2004	2005	2006	2007	2008	2009e*	2010e*	2011e*	2012e*	CAGR**
3.5"	20.53	25.11	30.31	35.62	35.85	35.51	43.66	52.90	64.77	12.6%
%	70.4%	108.4%	20.7%	17.5%	0.6%	-0.9%	23.0%	21.2%	22.4%	
2.5"	3.27	6.54	18.68	22.15	29.93	27.53	24.63	29.58	34.80	23.3%
%	63.9%	227.4%	185.9%	18.6%	35.1%	-8.0%	-10.5%	20.1%	17.6%	
<=1.8"	16.33	29.94	24.47	20.44	15.12	7.64	5.54	4.15	3.60	-23.3%
%	443.1%	895.7%	-18.3%	-16.5%	-26.0%	-49.5%	-27.5%	-25.1%	-13.3%	
Total	40.13	61.59	73.47	78.21	80.90	70.68	73.83	86.63	103.17	6.7%
%	135.4%	261.2%	19.3%	6.5%	3.4%	-12.6%	4.5%	17.3%	19.1%	

Source: TRENDFOCUS, November 2009

*Estimated

**Compound Annual Growth Rate, 2004-2012

Expansion of Product Offerings by HDD Manufacturers

HDD manufacturers have also begun looking to offer consumers non-HDD equipped products. WDC and Seagate both sell media players that allow end-users to listen to music or view photos or videos stored on an external HDD on their TVs. New generations also serve as an interface between a user's computer and television, allowing media from websites such as Pandora and YouTube to be played back through a TV.

8. INDUSTRY OVERVIEW (cont'd)

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INDUSTRY REPORT**

Although such devices account for very little of HDD manufacturers' total revenues, they are beginning to gain traction and are expected to see increased sales as consumers become aware of their capabilities.

New End-User Devices

Digital video recorders (set-top boxes that include an HDD for storage, time shifting and other functions) came onto the scene quickly, and in 2009 are forecast to account for more than half of total CE HDDs shipped. Of the three form factors, the 3.5" market has been the most consistent through the years. Nearly 100% of 3.5" CE HDDs are currently used in DVRs, and this application will drive the CE market. And as high-definition television becomes more mainstream, higher-capacity HDDs will be needed to record video content. At the current compression scheme, it is estimated that 120 GB will record 100 hours of standard definition or 25 hours of high definition programming. Thus 3.5" CE HDDs will continue to gradually increase in capacity as consumers will want to record more video content.

A significant portion of 2.5" CE HDD volumes is linked to the game console market. Both Microsoft and Sony launched upgraded models of Xbox and PS3, respectively, using higher-capacity 2.5" HDDs. The other big 2.5" CE HDD market is auto intelligence systems, but this market has been hindered by languishing sales of new vehicles due to global recession.

Although the <=1.8" CE HDD market is not what it was before Apple began using flash memory in iPods, an iPod Classic refresh announced in September breathed some life back into this market. The Classic now features a 160 GB single-platter drive, and Apple commented that there is still some demand for the last HDD-based iPod in its lineup. HDD-based digital video cameras continue to ship, but models employing flash storage solutions are gaining in popularity.

The external HDD market has grown over the last four years, and with end-users downloading and storing more and more digital content, this market holds great promise for the future. HDD manufacturers' external drives such as WDC's My Book and Seagate's FreeAgents have a clear cost advantage over non-HDD manufacturers-based external drives (such as Buffalo's DriveStation and Iomega's Prestige), and thus HDD manufacturers lead this space. Apple also offers external storage. The Time Capsule, available in one terabyte capacity, is popularising external storage by wirelessly backing up PCs in homes and small businesses. Its Apple TV uses a 160 GB HDD to record up to 200 hours of video programming that can be distributed through a household. In terms of size, growth in 2.5" external HDDs sales has outpaced the 3.5" market due to price and rising storage capacities. Unit shipments of external HDDs in 2008 totaled 48.16 million, and are expected to grow to over 56 million in 2012.

Due to the global economic crisis and the resultant pressure on consumer spending, CE HDD unit shipments are expected to be down year-over-year. However, if the global economy stabilises, the consumer electronics segment may rebound starting in 2010.

8. INDUSTRY OVERVIEW (cont'd)

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INDUSTRY REPORT

HDD INDUSTRY OUTLOOK

Outlook by Segment/Growth Drivers

2009 began as an uncertain year. With three-fourths of the year now recorded, PC and HDD sales are expected to increase from 2008's levels primarily as a result of lower PC prices, spurred to some degree by the low-priced netbook and the broadening role of PCs in daily life. Looking beyond 2010, PC and 2.5" HDD demand is expected to remain healthy, and both of these segments are forecasted by TRENDFOCUS to grow by 10% to 15% annually through 2012. PCs have a typical lifespan of four to five years, but the average lifespan of a corporate PC in the United States and Europe is estimated at close to six years. With Windows 7 emerging, very low system prices on all levels of products, and a recovering global economy, TRENDFOCUS expects that PC upgrades will ensue in 2010 to 2012.

The **desktop market** (which uses most of the 3.5" HDDs sold) comprises 3.5"-ATA/SATA-interface HDDs, which are generally configured in single-user desktop PC applications. High-end desktop-class ATA/SATA-interface drives are increasingly used in many low-end and mid-range multi-user server and storage systems, as well as in new consumer products. 5.25" desktop-class HDDs were mainstream in the 1980s and some designs persisted until 1999, but this form factor is now obsolete. TRENDFOCUS believes the total desktop HDD market will begin a long-anticipated decline starting in 2009, contracting at a -12.5% CAGR from 2009 to 2012 (as compared to a 3.9% CAGR from 2005 to 2008). The average capacity of a desktop PC has increased significantly. Users moved from 162 GB at the end of 2006 to 483 GB in the third quarter of 2009, a growth rate of 298.1%.

The **mobile HDD market** comprises 2.5" ATA/SATA-interface HDDs, which are generally used in notebook and netbook PCs, and also configured in some blade servers as boot devices. The 2.5" mobile HDD market has the largest number of viable suppliers relative to volume of sales. All five HDD manufacturers produce these drives.

Notebook PCs (which utilize primarily 2.5" HDDs) have overtaken desktop PCs to become the largest segment of the PC market. Netbook PCs and now Consumer Ultra Low Voltage PCs are changing the notebook PC landscape, and consumers are benefitting from their prices and improved performance. This market is expected to grow at a 21.2% CAGR from 2009 to 2012. Within three years, notebook PCs are expected to account for approximately three-fourths of all PC shipments. The average capacity of a notebook PC is also increasing at a fast pace. Users moved from 80 GB at the end of 2006 to 280 GB in the third quarter of 2009, a growth rate of 350.0%

An important factor in the rise of popularity of notebook PCs has been the emergence of netbook PCs. Originally intended to be light-duty, internet-focused computing devices, netbooks quickly took on software and capabilities that made them more similar to entry-level notebook PCs, except with a less capable CPU, no optical disk drive and a smaller and lighter chassis. Netbook PCs were also priced low, first starting at less than US\$500 and quickly dropping to well under US\$300 for entry-level models. While many expected the netbook PC market to dominate the mobile computing market during tough economic times, a different effect occurred. Pricing of full-featured notebook PCs began to fall and end users who were dissatisfied with the compromises required to use a netbook PC could find a full-featured notebook PC with a larger screen, optical drive, larger HDD and more powerful CPU for an additional US\$100 over the cheapest netbook PCs. In the fourth quarter of 2009, a full-featured notebook PC could be purchased for less than US\$300, with many more starting well under US\$500. Consumers are finding that the cost of replacing an aging PC or adding an additional PC is so inexpensive as to be nearly a disposable purchase. The significant price reductions in notebook PCs have fueled the recovery of both the PC and HDD markets. Mobile operators worldwide such as AT&T, SingTel, and Verizon, are contributing to the growth in netbook sales. Subscribers can get a netbook for virtually no upfront charge by agreeing to a one or two year service contract. This gives mobile PC users a very portable, full-function computing device with always-on wireless internet access.

TRENDFOCUS predicts that shipments of 2.5" mobile HDDs will grow at a 25.2% CAGR from 2009 to 2012 (from 221.34 million to 434.90 million units). Netbook sales totaled 9.80 million in 2008, and are expected to grow to over 25 million in 2009.

8. INDUSTRY OVERVIEW (cont'd)

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INDUSTRY REPORT**Personal Computing Market Overview (M)**

	2005	2006	2007	2008	2009e*	2010e*	2011e*	2012e*	CAGR**
Desktop, Units	143.45	145.15	142.51	144.88	130.93	119.48	111.50	105.40	-4.3%
%	9.6%	1.2%	-1.8%	1.7%	-9.6%	-8.7%	-6.7%	-5.5%	
Mobile, Units	75.83	98.22	124.72	148.73	166.98	211.58	252.85	297.60	21.6%
%	33.9%	29.5%	27.0%	19.3%	12.3%	26.7%	19.5%	17.7%	
Total PC Units	219.28	243.37	267.23	293.61	297.91	331.06	364.35	403.00	9.1%
%	16.9%	11.0%	9.8%	9.9%	1.5%	11.1%	10.1%	10.6%	

Source: TRENDFOCUS, November 2009

*Estimated

**Compound Annual Growth Rate, 2005-2012

The **enterprise market** segment comprises 3.5" and 2.5" SCSI-, SSA-, SAS- and FC- interface HDDs, which are generally configured in multi-user server and storage system applications. Some enterprise-class drives are used in high-performance desktop computers. 5.25", 8", 10" enterprise-class HDDs were mainstream during the 1980s and early 1990s. However, the last 8" and 10" enterprise drives were shipped in 1996. Some 5.25" enterprise designs persisted until 1999, but this form factor is now obsolete.

Enterprise-class HDDs are the most-specialised, reliable, and highest-performing of all HDD designs, and are primarily intended for use in 7x24x365 mission-critical storage applications. They are also the most expensive HDDs.

Enterprise computing collapsed at the end of 2008 but is now seeing a slow but steady recovery. In 2010, the resumption of corporate spending for purchases that have been mostly deferred through much of 2009 is expected to result in an increase in enterprise HDD shipments.

TRENDFOCUS believes the enterprise market segment will grow at a 14.2% CAGR during 2009 to 2012 (as compared to a 6.7% CAGR during 2005 to 2008).

Enterprise Computing Market Overview (M)

	2005	2006	2007	2008	2009e*	2010e*	2011e*	2012e*	CAGR**
Servers, Units	5.58	6.42	7.18	7.82	7.31	9.08	10.35	11.60	11.0%
%	11.6%	15.1%	11.8%	8.9%	-6.5%	24.2%	14.0%	12.1%	
Multi-User Sys, Units	0.24	0.24	0.24	0.23	0.14	0.22	0.24	0.27	1.7%
%	0.8%	0.0%	0.0%	-4.2%	-39.1%	57.1%	9.1%	12.5%	
Total Enterprise Units	5.82	6.66	7.42	8.05	7.45	9.30	10.59	11.87	10.7%
%	11.2%	14.4%	11.4%	8.5%	-7.5%	24.8%	13.9%	12.1%	

Source: TRENDFOCUS, November 2009

*Estimated

**Compound Annual Growth Rate, 2005-2012

The CE market is an important demand sector for HDDs. The 3.5" HDD market is dominated by the DVR, while the 2.5" segment is driven by game consoles and a small percentage of auto navigation systems. The 1.8" HDD, which was the driver of the CE HDD market for several years because of Apple's iPod, has been replaced by flash technology. Some digital video cameras and one iPod (Classic) use 1.8" HDDs, but due to the rigors of a small handheld device, it is only a matter of time before a complete switch to solid state drives is made.

8. INDUSTRY OVERVIEW (cont'd)

**JCY INTERNATIONAL BERHAD
INDUSTRY REPORT**

IMPACT OF SSDs IN SHORT TO MEDIUM TERM

The SSD market continues to rapidly evolve – although the actual displacement of HDDs is statistically insignificant. There are two primary markets for SSDs: enterprise systems (servers, multi-user systems, storage arrays) and notebook (client) PCs. The enterprise SSD market continues to be dominated by a single supplier – STEC, Inc. (“STEC”). However, all HDD manufacturers are intending to enter the enterprise SSD market over the next year or two, and some may also provide “hybrid” HDDs – the inclusion of a few gigabytes of flash in the HDD to offer better performance at a nominal increase in price. This may well stem the incursion of SSDs into the enterprise market.

SSD displacement of HDDs in mobile computing is nearly non-existent. High prices and relatively low capacities are inconsistent with the low-cost mentality of PC OEMs and buyers. Even with continued reductions in the cost per GB of these SSDs, adoption into client computers remains the realm of the technical enthusiast and other early adopters. SSDs will play an important, but coexistent role along with HDDs to address broadening data storage needs for years to come.

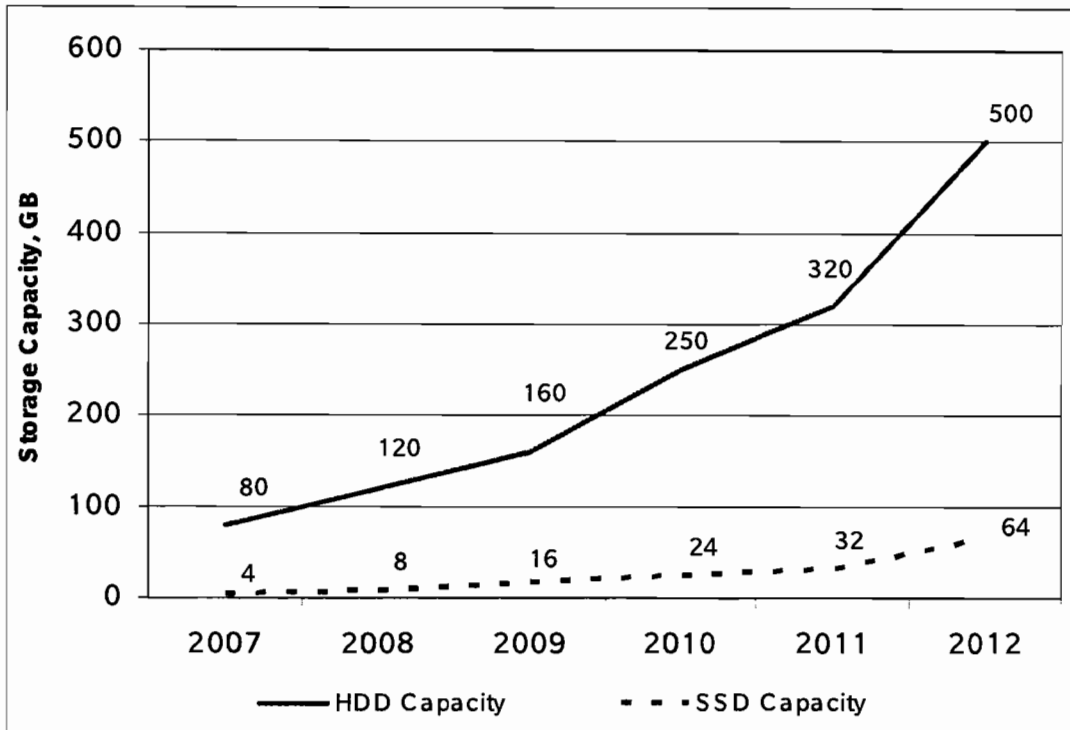
In late 2008, when there was oversupply in the NAND flash market and pricing per GB of flash memory was declining in excess of 50% per year, SSDs for client computers (notebook and desktop PCs) cost, on average 18 times more per GB than HDDs used in similar applications. For enterprise applications, the average cost per GB premium of SSDs was between 10 and 40 times that of HDDs.

Enterprise SSDs likely will be used mutually in applications where the highest possible storage performance is required, displacing only a small number of high speed, arrayed HDDs deployed in high-speed transactional systems and databases. As more enterprise SSDs suppliers emerge onto the market and as costs drop, SSDs will begin to provide a high performance storage layer in mid-range servers and storage systems. The market for the highest performance, 15,000 rpm enterprise HDDs are expected to be marginalised by SSDs over time; however, 10,000 rpm HDDs may continue to grow and coexist with SSDs in this segment as the storage capacity and cost per gigabyte benefits of more modest-performing HDDs continue to provide a compelling solution of enterprise storage and will not be completely displaced by SSDs. TRENDFOCUS believes that enterprise SSDs will comprise only a small fraction of the total SSD market, reaching 2.5 million annual units in 2012. SSDs sold into the notebook PC are expected to reach 36.75 million units shipped in the same year, forming a total computing SSD market size of just over 39 million units in 2012. This represents only 5% of the estimated total storage device market in that year.

In the client computing market, the cost premiums of SSDs over HDDs are likely to continue to exist for at least the next four years. While consumers will likely shy away from SSD adoption due to high costs and the need for higher capacity, more cost effective storage provided by HDDs, a niche of corporate PC users may move to solid state storage. In corporate computing environments, high performance storage will benefit productivity and the mechanical robustness of SSDs for highly mobile professionals will also reduce downtime from potential HDD mechanical failure. SSDs deployed into this environment tend to have average lower capacities than HDDs, thus reducing some of the device cost premiums between solid state and rotating magnetic storage. In addition, the price per GB of HDD storage continues to fall slightly, maintaining or extending the gap between HDDs and alternatives such as SSDs. The price per GB of SSD storage is currently eight to thirty times that of HDD storage.

The following graph plots the current cost per GB differences between HDDs and SSDs used in client and enterprise applications. The flash memory market is no longer in a state of oversupply and cost per GB of raw NAND memory has increased since the lows of late 2008. As a result, SSDs in general have not seen significant reductions in cost per GB premiums compared to HDDs. For desktop and mobile PC applications, the premium dropped slightly in the first half of 2009, from 18 to less than 17 times the cost per GB of HDDs. The gap in price per GB between SSDs and HDDs has grown in the third quarter of 2009. In the enterprise segment, the high range of the premium over HDDs has dropped from an average of 40 times down to 30 times – this is due largely to additional competitors entering the market to challenge STEC’s current monopoly of the enterprise SSD market.

8. INDUSTRY OVERVIEW (cont'd)

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INDUSTRY REPORT**Price per GB Comparisons between HDD and SSD – Client and Enterprise (US\$)**

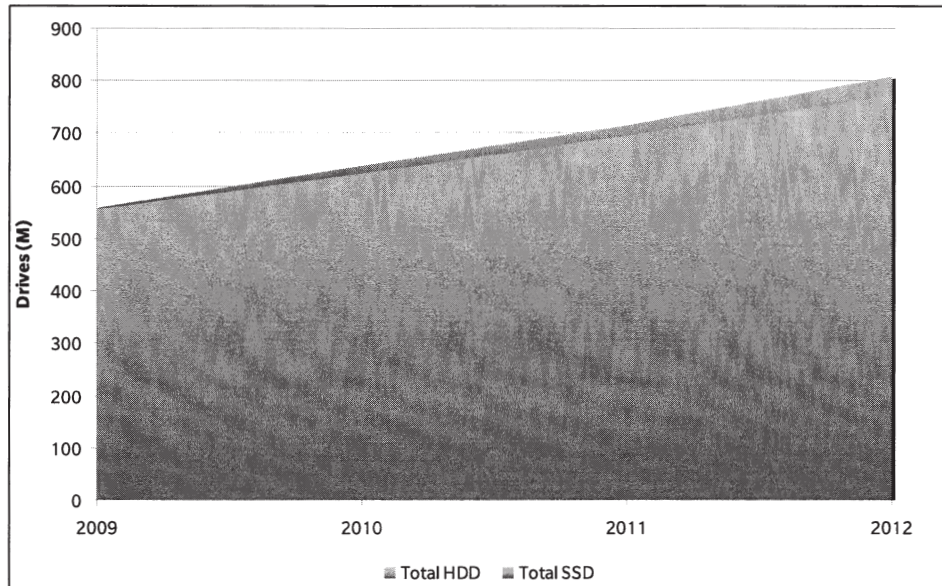
Source: TRENDFOCUS, November 2009

The SSD market for computing applications in which an SSD could replace an HDD as the primary storage device is forecasted to reach almost four million units in 2009. Statistically, this is less than 1% of the total HDDs that will ship in 2009. This includes SSDs used in traditional enterprise applications, notebook PCs and cards used in netbooks. Netbook PCs comprise the largest category of SSDs that will ship in 2009 (approximately 2.5 million, under 10% of all netbooks shipped), but the fact that more than 90% of netbooks now ship with HDDs is likely to cause SSD growth rates in this category to stagnate and leave HDDs as the dominant storage medium in nearly all forms of mobile computers.

The performance-oriented enterprise SSDs will see very small shipments in 2009. However, this market will be the one targeted by HDD manufacturers such as Seagate, WDC, HGST (in a joint venture with Intel), and Toshiba. All of these HDD manufacturers have experience with the stringent qualification and support requirements demanded by the enterprise computing and storage markets – a fact that is a barrier to entry for most SSD-only companies. While Toshiba had offered an enterprise SSD in early 2009, it saw little success as it did not have enterprise storage expertise until it acquired Fujitsu's HDD unit in October of 2009. Toshiba is expected to re-align its enterprise SSD strategy in light of its new capabilities. TRENDFOCUS expects Toshiba and the other HDD manufacturers will begin to enter the market in 2010, although this is not expected to significantly alter the speed of SSD penetration.

8. INDUSTRY OVERVIEW (cont'd)

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INDUSTRY REPORT**

Total HDD and SSD Market Through 2012

Source: TRENDFOCUS, November 2009

Samsung and Toshiba are the strongest candidates for long term survival in this cost-dominated client segment. The major benefit for both is a captive NAND flash manufacturing capability. As the cost of SSD storage is dominated by the cost of the flash memory itself, the ability to acquire NAND at low cost provides huge advantages over other would-be competitors who must buy memory at a higher OEM price. Long term competitiveness to compete as the client SSD market becomes commoditised will require the ability to control material costs – hence captive flash memory supply is likely a mandatory element, long term.

In summary, SSDs are not likely to represent a significant threat to HDDs in the near- or medium term through 2012. All of the five key HDD manufacturers are planning to enter the SSD market in 2010 as they recognise the technology as primarily complementary to HDDs and less of a direct competitive threat.

8. INDUSTRY OVERVIEW (cont'd)

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HDD COMPETITIVE LANDSCAPE

Seagate

	2005	2006	2007	2008	Three Months Ended		
					Mar-31 2009	Jun-30 2009	Sep-30 2009
Totals							
Enterprise share	13.77	15.68	18.23	20.02	3.40	3.63	3.98
Desktop share	52.5%	56.6%	61.0%	62.8%	61.2%	62.1%	59.9%
Desktop	67.15	84.47	106.73	102.26	22.46	21.90	23.27
Desktop share	31.3%	36.7%	42.7%	42.4%	42.8%	39.9%	39.1%
Mobile	9.12	15.45	25.07	29.82	8.92	11.33	13.85
Mobile share	11.7%	15.2%	17.5%	16.0%	20.9%	20.6%	21.6%
CE	17.87	23.69	25.51	18.39	3.66	3.77	5.17
CE share	28.6%	31.0%	32.6%	22.7%	30.4%	23.8%	23.5%
Total Units	107.91	139.29	175.54	170.49	38.44	40.63	46.27
share	28.3%	32.0%	35.0%	31.6%	34.1%	30.9%	30.4%
Revenue	\$8,536	\$10,607	\$12,273	\$11,975	\$2,243	\$2,369	\$2,628

Source: TRENDFOCUS, November 2009

Seagate's headquarters is located in Scotts Valley, California, just south of Silicon Valley. The company's four factories are in China (Wuxi and Suzhou, which combine for almost two-thirds of output); sites in Korat, Thailand, and Singapore account for the balance. Seagate is the market leader in total HDD shipments and possesses revenue. It has been and continues to be one of the most highly vertically integrated companies, fulfilling a large percentage of its heads and media needs from captive capacity. Seagate continues to drive development of advanced technologies such as heat-assisted magnetic recording and discrete-track recording, considered to be two of the options for next-generation magnetic recording technology.

WDC

	2005	2006	2007	2008	Three Months Ended		
					Mar-31 2009	Jun-30 2009	Sep-30 2009
Totals							
Enterprise share							
Desktop	56.84	68.22	77.64	78.94	17.90	19.43	21.68
Desktop share	26.5%	29.7%	31.0%	32.7%	34.1%	35.4%	36.4%
Mobile	3.35	7.81	22.15	50.37	10.11	16.91	19.31
Mobile share	4.3%	7.7%	15.4%	27.1%	23.7%	30.8%	30.1%
CE	6.04	9.20	13.12	15.32	3.48	3.66	3.06
CE share	9.7%	12.0%	16.8%	18.9%	28.9%	23.1%	13.9%
Total Units	66.23	85.23	112.91	144.63	31.49	40.00	44.05
share	17.4%	19.6%	22.5%	26.8%	27.9%	30.4%	28.9%
Revenue	\$3,987	\$4,907	\$6,747	\$8,399	\$1,615	\$1,975	\$2,125

Source: TRENDFOCUS, November 2009

WDC has its headquarters in Lake Forest, California and its manufacturing plants in Kuala Lumpur, Malaysia and two in Thailand (Bang-pa In and Navanakorn). Through timely strategic acquisitions and product launches, WDC has become a leader in the HDD industry. With its recent enterprise HDD product announcement, the company now offers a complete line up of products. More importantly, WDC leads the 2.5" HDD space, which is the fastest-growing HDD segment of the market. Additionally, WDC is the leader in another critical space, the retail and branded market. With a complete set of external/USB-attached HDDs, the company has become the standard in this space.

8. INDUSTRY OVERVIEW (cont'd)

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INDUSTRY REPORT

HGST

	Three Months Ended						
	2005	2006	2007	2008	Mar-31 2009	Jun-30 2009	Sep-30 2009
Totals							
Enterprise	3.37	4.15	4.70	5.70	1.10	1.20	1.50
share	12.9%	15.0%	15.7%	17.9%	19.8%	20.5%	22.6%
Desktop	17.90	24.22	34.07	31.29	6.44	7.35	6.87
share	8.3%	10.5%	13.6%	13.0%	12.3%	13.4%	11.5%
Mobile	25.18	30.76	39.96	39.92	9.93	10.50	10.80
share	32.4%	30.3%	27.8%	21.4%	23.2%	19.1%	16.9%
CE	12.06	10.88	10.65	14.20	1.73	3.21	5.85
share	19.3%	14.2%	13.6%	17.6%	14.4%	20.2%	26.6%
Total Units	58.51	70.01	89.38	91.11	19.20	22.26	25.02
share	15.4%	16.1%	17.8%	16.9%	17.0%	16.9%	16.4%
Revenue	\$4,280	\$4,876	\$5,563	\$5,837	\$1,091	\$1,209	\$1,350

Source: TRENDFOCUS, November 2009

HGST is headquartered in San Jose, California, and has four manufacturing factories in Asia. Of the four sites, Shenzhen plant in PRC is the largest followed by two plants in Thailand (Prachinburi and Saha Union), and then the Singapore factory. In 2002, HGST purchased IBM's Storage Technology Division and, by merging that with its own HDD group, formed HGST Global Storage Technologies. The company ships at approximately half the volume of market leaders Seagate and WDC, but it covers most of the HDD markets. The company's focus and directives will likely include a change in key component suppliers as HGST strives to streamline costs. This new directive will bring about new opportunities for third-party mechanical component suppliers as HGST moves away from concentrating on utilising primarily Japanese-based parts.

Toshiba

	Three Months Ended						
	2005	2006	2007	2008	Mar-31 2009	Jun-30 2009	Sep-30 2009
Totals							
Enterprise							
share							
Desktop							
share							
Mobile	17.37	17.59	21.99	26.90	5.19	7.11	8.72
share	22.3%	17.4%	15.3%	14.4%	12.1%	12.9%	13.6%
CE	16.61	21.90	15.46	19.92	2.14	4.19	6.99
share	26.6%	28.6%	19.8%	24.6%	17.8%	26.4%	31.7%
Total Units	33.98	39.49	37.45	46.82	7.33	11.30	15.71
share	8.9%	9.1%	7.5%	8.7%	6.5%	8.6%	10.3%
Revenue	\$2,679	\$3,404	\$2,752	\$2,637	\$375	\$567	\$758

Source: TRENDFOCUS, November 2009

Toshiba is headquartered in Tokyo, Japan, and has the most factories of all of the HDD manufacturers. Of its five manufacturing sites, only one is located in Japan; however, that location primarily serves as the R&D center. The other factories are located in the Philippines (Binan Laguna and Calamba Laguna), China (Shenzhen), and Thailand (Navanakorn). On October 1, 2009, Toshiba acquired Fujitsu's HDD division, a move intended to increase Toshiba's segment coverage (Fujitsu had been the second-largest supplier of enterprise HDDs) and bolster the company's access to core technologies (Fujitsu developed and manufactured a sizable portion of its recording heads and media). Combined with this spinning-disk storage capability is Toshiba's large stake in NAND flash and SSDs. The company is now positioned with one of the broadest storage portfolios in the business – in both HDD and SSD.

8. INDUSTRY OVERVIEW (cont'd)

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INDUSTRY REPORT

Samsung Electronics

	Three Months Ended						
	2005	2006	2007	2008	Mar-31 2009	Jun-30 2009	Sep-30 2009
Totals							
Enterprise share							
Desktop	25.09	33.91	28.96	24.94	5.65	6.21	7.75
share	11.7%	14.7%	11.6%	10.3%	10.8%	11.3%	13.0%
Mobile	4.97	7.08	9.14	12.51	3.72	4.30	6.12
share	6.4%	7.0%	6.4%	6.7%	8.7%	7.8%	9.6%
CE	3.03	6.67	9.72	6.64	0.65	0.76	0.67
share	4.8%	8.7%	12.4%	8.2%	5.4%	4.8%	3.0%
Total Units	33.09	47.66	47.82	44.09	10.02	11.27	14.54
share	8.7%	10.9%	9.5%	8.2%	8.9%	8.6%	9.5%
Revenue	\$2,126	\$3,049	\$2,965	\$2,650	\$512	\$553	\$711

Source: TRENDFOCUS, November 2009

Samsung's headquarters is located in Suwon, Korea. The company has one factory in Gumi, Korea, but is moving more manufacturing responsibilities to its subcontractor located in Donguan, China. Samsung is one of the largest technology companies in the world. The HDD division operates within the same global division dominated by its sister semiconductor division. Theoretically, the company can offer a total storage solution package. Samsung joined the HDD market in 1988. Samsung is one of two major HDD companies without vertical integration. The company relies heavily on SAE Magnetics (wholly owned subsidiary of TDK Corporation of Japan) for recording heads, and Showa Denko and Fuji Electric for finished media disks. All expansion of manufacturing capacity is expected to occur at SAE Magnetics.

8. INDUSTRY OVERVIEW (cont'd)

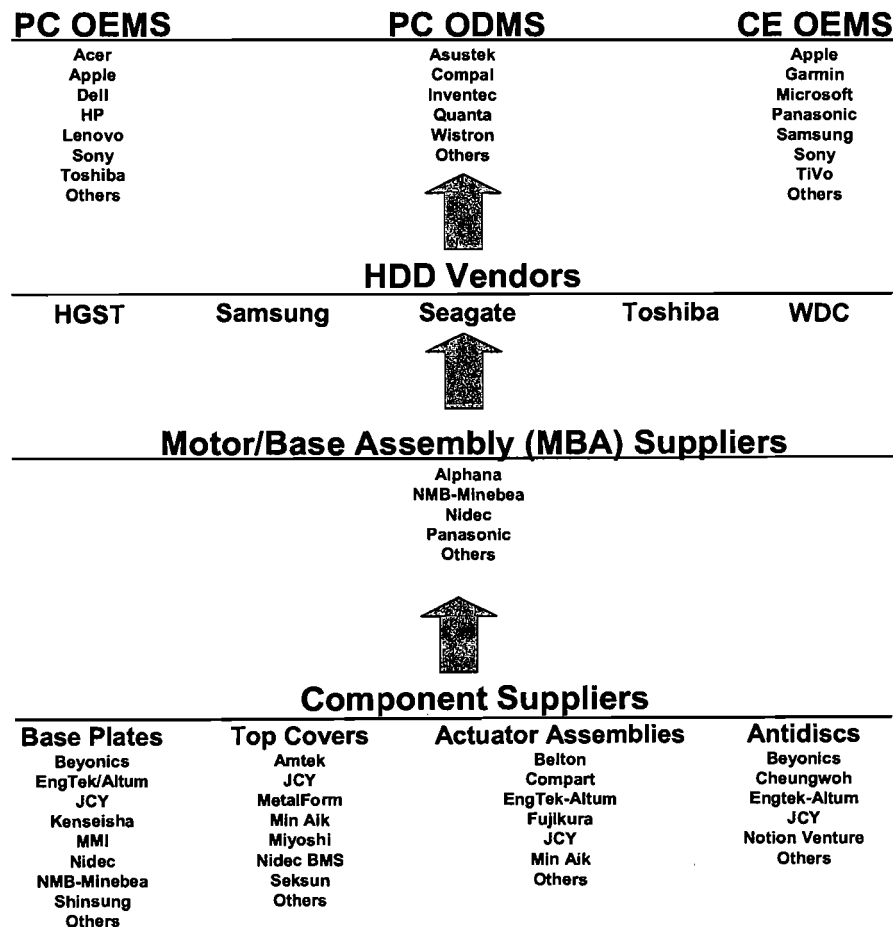
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HDD VALUE CHAIN OVERVIEW

The HDD industry's components supply chain is a focused and tightly connected group of companies, most of which have been in the business for many years. With regard to suppliers of base plates, top covers, actuator assemblies and anti-disks/separators, there are several competitors but the market has evolved and most weaker competitors have dropped out. The HDD industry's supply chain can be characterised as follows:

Component makers are pivotal in the value chain: All HDDs use a base plate, top cover, and actuator assembly; others also use antidisks. The level of technology and manufacturing efficiency needed to compete is higher than in most other industries, and cost pressures are unrelenting. While much of the attention on HDDs might go to storage capacity and performance, without a base or cover or actuator, the HDD would not exist.

There are strategic relationships between companies: After years of collaborating on product design, enduring fluctuations in demand, and managing production ramps, HDD companies do develop strategic relationships with certain suppliers. These relationships are often pivotal in the evolution of a supplier, providing both linearity of order volumes and the necessary scale and experience to broaden a customer base.



8. INDUSTRY OVERVIEW (cont'd)

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Evolving Relationships Between Hard Disk Drive Manufacturers and Component Suppliers

Typically, HDD manufacturers will use two or three suppliers for any critical components they do not source from their own factories. How much a "tier one" supplier accounts for can change from one HDD company to the next, and even among the HDD programs within that customer. Often, the top supplier can be 50% or more of an HDD company's requirements, with another one or two accounting for the remaining volume. The strategy is designed to ensure a degree of pricing leverage and an ability to meet fluctuating market demands. While HDD manufacturers devote the most energy and time to working with their primary suppliers to optimise the cost and design of components, they also have back-up capacity from secondary suppliers.

HDD manufacturers will often specify the raw materials and all aspects of the component design, eventually conducting joint pilot tests for any new product with their primary suppliers. HDD manufacturers will also provide continuously updated production forecasts to help component suppliers manage their manufacturing volumes. Component manufacturers make significant capital investments based on the HDD manufacturer's design and production forecast and subsequently supplies parts to the HDD manufacturer on a "just-in-time" ("JIT") basis. In most cases, close and constant interactions of design and process engineers from both the HDD manufacturers and component manufacturer will be required to ensure requisite levels of ongoing quality and reliability. The complex, costly, and time-consuming integration of component design and high-volume manufacturing with agreed-upon stocking levels in bonded JIT warehouses makes it difficult for any HDD manufacturers to quickly or cost-effectively switch suppliers for precision-tooled parts.

Currently, most HDD manufacturers are headquartered in either US or Japan with factory plants located in Singapore, Malaysia, Thailand, Korea, Indonesia, the Philippines, and China. The component manufacturers are mainly headquartered in Japan, Singapore, and Malaysia, with manufacturing plants in Singapore, Malaysia, Thailand, Korea, Indonesia, the Philippines and China.

Overall Trends in HDD Industry Structure**Non-Vertical Components**

Components that require less-intense research, development and integration are usually outsourced to external HDD component manufacturers, at least in terms of production. In many cases, the HDD manufacturer will play a critical role in specification and design. Primary non-vertical HDD components include the following: actuator assemblies, base plates, top covers, eblocks, ASICs, and printed circuit board assemblies.

Manufacturing Migrations

In the 1980s and 1990s, Singapore was the primary HDD manufacturing hub, but in recent years, there has been increasing migration to other countries. WDC moved its factories to Malaysia and Thailand, and Seagate now has factories in Thailand and China.

Strategic, Symbiotic Relationships to Prevail

As with the HDD industry as a whole, the HDD supply base has also undergone considerable consolidation. TRENDFOCUS believes that symbiotic relationships (based on shared risks and rewards) rather than tactical partnerships (based largely on lowest available prices) will increasingly define the HDD supply chain, engendering greater efficiencies of cost, quality, and reliable scale among fewer suppliers.

8. INDUSTRY OVERVIEW (cont'd)

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HDD COMPONENT INDUSTRY OVERVIEW

Key Components of a HDD

Platters (also known as “media” or “disks” or “discs”): The platters – flat, round disks coated with special magnetic materials – are where the data is stored in a drive. A spindle motor rotates the platters at a specific speed (4200rpm, 4500rpm, 5400rpm, 7200rpm, 10,000rpm or 15,000rpm, depending on the drive design). Current-generation drives can be configured with up to 5- disks (and 10 heads) per head disk assembly (HDA). Most massive-volume mainstream HDDs contain only one or two disks, in one-, two-, three- or four-head configurations.

Read/Write Heads: Magnetoresistive heads, mounted on flexures extending from the actuator arms, can read or write data to both sides of the spinning disk. The heads are the most complex, fragile and technologically advanced component in HDDs.

Actuators. The actuator, whose microscopically precise motions are controlled by a voice coil assembly, is used to position the read/write head(s) over the appropriate track(s) of the spinning disk(s).

Logic Boards/Printed Circuit Board Assemblies (PCBAs). The external interface and internal processor ASICs (application specific integrated circuits) are located on the PCBA, which houses the central intelligence and design-specific microcode of the drive.

ENCLOSURES. TO PROTECT THE HEAD DISK ASSEMBLY FROM EXTERNAL CONTAMINANTS, IT IS ENCASED IN A BASE PLATE AND A TOP COVER, WHICH ARE SCREWED TOGETHER USING FASTENERS AND AIRTIGHT FERROFLUIDIC SEALS.

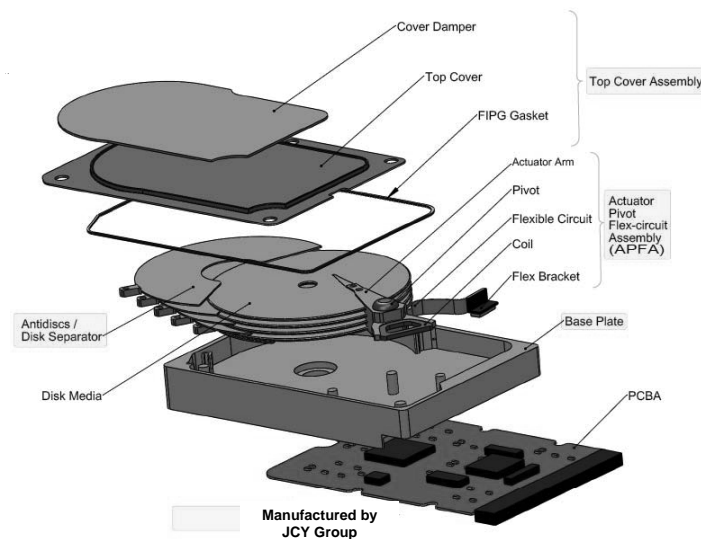


Fig: Exploded view of a Typical Hard Disk Drive

The **base plate** serves as the bottom of the HDD, where the top cover is screwed on. All of the other HDD components are attached to the base plate, either directly or indirectly. There are different configurations and approaches to this market. Companies such as JCY and MMI sell the base plate itself, whereas Nidec Brilliant buys external bases, builds some of its own, and sells an integrated motor base assembly (“MBA”).

The motor base assembly is a sub-segment of the base market. This is a base plate with the spindle motor attached. This assembly process was typically done by HDD companies, but now the spindle motor suppliers such as Nidec Panasonic, and Alphana are performing this assembly function. Nidec is the largest supplier of

8. INDUSTRY OVERVIEW (cont'd)

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spindle motors and MBAs, giving it leverage in supply and price. Suppliers include:

Beyonics is a Seagate supplier, and maintains plants in Tampoi, Malaysia, Changshu, China and Ayutthaya, Thailand. Its integrated operations can provide a variety of services including design, pilot runs, aluminum die casting, and e-coating.

EngTek-Altum, a subsidiary of Engtek, maintains two factories, one in Ayuthaya, Thailand and one in Johor Bahru, Malaysia. The company produces HDD mechanical components such as base plates and actuators. Its customer base includes Seagate, HGST and Minebea.

JCY is one of the largest manufacturers of HDD mechanical components in the world, with factories in Malaysia and Thailand and a future facility in China. In addition to base plates and top covers, JCY also manufactures antidisks and actuator assemblies used in HDDs. The company supplies components to the two largest HDD manufacturers by volume, Seagate and WDC.

MMI was formerly listed on the Singapore stock exchange before becoming privatised. The company is expanding its product lines outside of HDD components, although it maintains enough manufacturing capacity to grow output by at least 10% to 20%. Its primary customer is Seagate, and there is a strong relationship between the management of the two companies that stretches back several years.

Nidec, which TRENDFOCUS estimates to have a share of more than 70% of the spindle motor market, has more than 70% of the MBA market, and has more than 25% of the base plate market (via its acquisition of Brilliant Technology), is well-regarded by HDD companies (customers include Seagate, WDC, HGST, and Samsung) and has proven its willingness to expand capacity and output quickly.

Smaller base plate suppliers include Kenseisha, Shinsung, and NMB-Minebea (an MBA supplier).

Base Plate	HGST	Samsung	Seagate	Toshiba	WDC
Beyonics			T3		
EngTek-Altum			T4	T3	T3
JCY			T3		T1
Kenseisha				T2	
MMI		T4	T2		T4
Nidec	T4	T3	T3		T3
NMB-Minebea	T4		T4		
Shinsung		T2			
Others	T1	T1		T3	

Source: TRENDFOCUS, November 2009

T1: >=50% T2: 30-49% T3: 10-29% T4: <10%

By virtue of their lead supply positions at WDC and Seagate, JCY and MMI are the top two suppliers of base plates in the market.

The **top cover** seals the HDD and protects internal components. Top covers are sealed to the base via a rubber gasket to ensure a tight fit, and often incorporate a sound damper to minimise operating noise. Stainless steel is the primary material used. Primary suppliers include:

Amtek Engineering is a Singapore-based supplier of varied electronics and metal parts. Its primary customer is Seagate.

JCY supplies top covers to WDC.

MetalForm, also based in Singapore, specialises in small form factor metal stamping and provides top covers to WDC, Seagate, and other HDD manufacturers.

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Min Aik, headquartered in Taiwan, produces a variety of HDD components, including actuators, voice coil motors, latches, covers, and clamps. Its primary customer is WDC.

Miyoshi Precision Limited, headquartered in Singapore but with subsidiaries in Thailand, Malaysia, and China, caters to data storage companies (Toshiba and HGST), and the consumer electronics and automotive industries.

Nidec supplies top covers to WDC and Samsung.

Seksun is Singapore-based and supplies the HDD industry (primarily Seagate) with precision metal components via its stamping group.

Top Cover	HGST	Samsung	Seagate	Toshiba	WDC
Amtek			T4		
JCY					T1
MetalForm	T4	T1	T2		T3
Min Aik					T3
Miyoshi	T1			T1	
Nidec/Brilliant		T4			T3
Seksun			T2		
Others	T4	T2		T4	T4

Source: TRENDFOCUS, November 2009

T1: >=50% T2: 30-49% T3: 10-29% T4: <10%

Leading top cover suppliers, based on existing relationships, are JCY, MetalForm, and Miyoshi.

The **actuator assembly** holds the head-gimbal assemblies and connects to the base plate, allowing for the movement of the heads across the disk surface. Again, there are various delivery models, from the actuator arm itself (also known as an "e-block") to various value-added configurations that are for this report termed "actuator assemblies". There are company-specific acronyms such as APFA and PCCA, depending on terminology and tasks performed. These actuator assemblies contain everything but the head-gimbal assembly itself. Primary suppliers include:

Belton Technology Group, headquartered in Hong Kong, is a vertically integrated supplier of actuator assemblies (to all five HDD manufacturers), FPCBs, and magnetic coil assemblies.

Compart specialises in metal and plastic components for a variety of industries, including data storage. The company produces actuator assemblies for Seagate, Toshiba, and Samsung.

Engtek-Altum supplies actuator assemblies to Seagate, HiST, and Samsung.

Fujikura provides HDD components as well as optical communications products, FPCBs, and automotive parts. Customers include Seagate, HGST, Toshiba, and Samsung.

JCY supplies actuator assemblies to WDC.

Min Aik's primary customer for actuator assemblies is WDC.

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Actuator Asbl.	HGST	Samsung	Seagate	Toshiba	WDC
Belton	T2	T2	T2	T3	T2
Compart		T3	T2	T3	
EngTek-Altum	T3	T2	T3		
Fujikura	T1	T3	T4	T1	
JCY					T2
Min Aik					T4
Others					

Source: TRENDFOCUS, November 2009

T1: >=50% T2: 30-49% T3: 10-29% T4: <10%

Given that each HDD maker has a specialised actuator assembly design and each demands a different configuration (value) from its actuator assembly suppliers, a direct comparison is problematic. However, on a volume basis, JCY is one of the top producers, joined by Belton, EngTek-Altum, Compart, and Fujikura.

The **antidisc**, or stabiliser, manages airflow within a multiple-platter HDD to maintain stability of the disk while spinning. These products are used in multi-disk HDDs only. WDC and Seagate are the largest consumers of antidiscs. Primary suppliers include:

Cheungwoh is a Singapore-based supplier of antidiscs that also provides metal stamping services to the consumer electronics industry. Its primary customer is WDC.

EngTek-Altum's primary customer for antidiscs is Seagate.

JCY supplies antidiscs to Seagate and WDC.

Notion Venture, based in Malaysia, supplies antidiscs to Seagate and WDC.

Antidisc	HGST	Samsung	Seagate	Toshiba	WDC
Chuengwoh					T2
EngTek-Altum			T3		
JCY			T1		T3
Notion Venture			T3		T2
Others			T4		

Source: TRENDFOCUS, November 2009

T1: >=50% T2: 30-49% T3: 10-29% T4: <10%

Given that the antidisc is a relatively new component relative to the other components. JCY, being one of the top producers, appears to be well positioned to continue to increase its production and supply of antidisc to both Seagate and WDC.

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OVERALL TRENDS IN HDD MECHANICAL COMPONENT INDUSTRY STRUCTURE

Multiple Component Product Line

Global HDD manufacturers have been streamlining their supplier base and have a strong preference for multi-component suppliers because they reduce administrative costs and optimise investment costs from a supplier's perspective. Since managing supply chains is costly and time-consuming, HDD companies tend to work closer with suppliers with track records in manufacturing and supplying multi-component products.

HDD manufacturers minimise the risk of any complementary components not being able to operate in tandem with each other, as the multi-component suppliers can also help manufacture and regulate the specifications and quality of the components. As a result, HDD manufacturers can be more assured of a similar level of quality for each HDD mechanical component obtained from these multi-component suppliers, given the identical level of quality control processes they would adopt as part of their manufacturing processes.

Being a multi-component supplier also presents a significant advantage, as these suppliers have the ability to use any or all of their products to penetrate new programs as these provide the necessary track record.

Vertical Integration and Operational Scale

Over the past five years, TRENDFOCUS has observed the trend of a select group of HDD mechanical component suppliers, such as JCY and Nidec, who have the scale and technical ability to evolve their operations into a more vertically integrated manufacturing process. This allows them to better plan and utilise their equipment to further streamline operations, resulting in lower costs while also enabling them to maintain better control over the design, production, and quality of the components they manufacture.

This affords these suppliers the ability to adapt quickly to any changes in customers' designs and products and also reduces reliance on outsourced work, while simultaneously improving quality control methods resulting in higher production yields and lower rejection rates.

Investment for Expansion in Production Facilities

The forecasted growth in HDD unit demand will, perhaps as soon as 2010, heavily pressure component manufacturers that do not expand capacity to reduce cost and satisfy larger orders. HDD mechanical suppliers which have expanded production capacity over the last two years will be well positioned to broaden their customer and program bases and to position themselves for further market share gains.

TRENDFOCUS notes that only JCY is investing in incremental capacity, while most HDD component manufacturers are hesitating to expand due to either financial constraints or the fact that they have adopted a "wait and see" approach. This will help to support growth of both its main customers, WDC and Seagate, as well as to provide adequate capability/capacity to deepen penetration of other HDD manufacturers' programs.

Strategic and Symbolic Relationships

This is a case of a "strategic relationship" mentioned earlier. It is quite common for HDD component manufacturers, in their early years, to rely heavily on a single customer for the majority of their revenue prior to expanding their customer base. TRENDFOCUS believes that the symbiotic relationships (based on shared risks and rewards) rather than tactical partnerships (based largely on lowest available prices) will increasingly define the HDD supply chain, engendering greater efficiencies of cost and reliable scale among fewer suppliers. WDC and Seagate (the top two HDD manufacturers) and existing HDD mechanical component suppliers would be expected to

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benefit from these stringent standards as the other HDD manufacturers continue to outsource their non-vertical components.

Barriers to Entry

The HDD industry and its supply chain are subject to high barriers to entry, owing mainly to the capital intensity of participation. Additionally, given the relatively mature state of the supply chain, HDD companies are unlikely to be open recipients to newcomers. In the HDD components arena, namely base plates and top covers, a total newcomer would likely spend at least US\$100 million to US\$200 million to get into the business – prior to facing customer resistance to working with, qualifying, and accepting the risk associated with a new supplier.

Qualification of parts such as base plates, covers, actuators, and antidisks typically takes six to ten months, during which time the manufacturers of these components do not receive any significant revenue from the companies attempting to qualify their products. It is customary that at least one leading supplier is included in HDD design from the early stages, whereby the specific details of construction are negotiated bilaterally so that it is optimised from a DFM and DFC perspective. It is paramount to HDD manufacturers that all components are well fitted during assembly. As such, it is quite difficult to simply drop a supplier once qualified as it is risky, expensive, and time-consuming to re-start the process.

TRENDFOCUS does not anticipate new entrants in the near future for any of the key HDD mechanical components.

Substitute Products/Services

Although there are a number of competitive suppliers for each HDD component, there are no substitute parts or services to replace the established materials and HDD component manufacturers with their existing track record.

Raw Materials Pricing Analysis

Costs of fundamental materials figure prominently in some products, and less prominently in others. For example, for a 3.5" base plate, the cost of aluminum can range from 45% to 60% of total product cost. For 2.5" HDD bases, the cost ranges from 40% to 50%. Historically, it is incumbent on the suppliers of parts to manage material costs – HDD companies have not allowed significant upward price adjustments if the commodity price increases. Conversely, HDD companies monitor commodity prices, and have negotiated for accelerated price declines if material prices erode.

Industry Structure/Outsourcing of Components

The term "vertical integration" in the HDD industry typically refers to the captive production of recording heads, disk media, and disk substrates. The HDD manufacturers in general outsource base plates, covers, actuator assemblies, and antidisks. Given the capital outlay needed to enter production of said parts, it is unlikely that any of the HDD firms will make a move to backward integrate into these areas.

Key HDD Manufacturing Hubs

After years of being centralised in Singapore, HDD manufacturing has migrated to lower cost countries such as China, Malaysia, Philippines, and Thailand. Over 90% of all HDDs are produced in those four countries. As such, some of the HDD mechanical suppliers have also relocated their manufacturing locations to be close to their customers. This is critical to the HDD manufacturers as they operate on a JIT basis and the timely delivery

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of components is critical. From the suppliers' perspective, being located in close proximity helps to improve their overall response time to customers' requests and also lowers logistics costs.

Currently, the HDD manufacturers are located in the following countries.

Seagate: China (HDDs), Thailand (HDDs, heads), Singapore (media)

WDC: Malaysia (HDDs, media), Thailand (HDDs, heads)

HGST: China (HDDs, media), Thailand (HDDs), Singapore (HDDs), US (media)

Toshiba: Japan (HDDs), Philippines (HDDs), Thailand (HDDs), China (HDDs, via SAE subcontracting)

Samsung: Korea (HDDs), China (HDDs, via SAE subcontract assembly)