

IMEX



Disk Storage

State of the Industry Report
2008

Author: Anil Vasudeva
Chief Analyst, IMEX Research

IMEX
RESEARCH

1 EXECUTIVE SUMMARY

1.1 Market Drivers

- 1.1.1 Demand Drivers: The Data Explosion
- 1.1.2 Disk Drive Cost Drivers
- 1.1.3 Emerging Consumer Electronics Market

1.2 Market and Product Requirements

1.3 Pricing of Storage Devices

- 1.3.1 Hard Disk Drives
- 1.3.2 Optical Drives

1.4 Market Forecast

- 1.4.1 HDD Market Share Roll-Up

1.5 Technological Advancements

- 1.5.1 Areal Density
- 1.5.2 Rotational Speed

1.6 Major Suppliers and Strategies

1.7 Channels of Distribution

2 MARKET DRIVERS & DYNAMICS

2.1 Industry Outlook and Overview

2.2 Demand Drivers: The Data Explosion

2.3 Spending on Computer Storage

2.4 The Long-Term Storage Demand Outlook

- 2.4.1 A Top-Down View-PC and Server Demand

2.5 Disk Drive Cost Drivers

- 2.5.1 Metrics affecting Disk Drive Costs

2.6 Disk Drive Assessment Metrics

- 2.6.1 Performance - Seek, latency, Data Transfer Rate, Cache Size, Spindle Synchronicity
- 2.6.2 Availability - MTBF, Field Failure Rates, Redundant Paths ...
- 2.6.3 Cost - Standard Off-the-shelf-components, max GB/disk platter
- 2.6.4 Scalability - Investment Protection, Migrations, Mix & Match ...
- 2.6.5 Interoperability

2.7 Reducing Cost of Ownership

- 2.7.1 Price Differentials due to key HDD Performance Parameters
- 2.7.2 Reducing Total cost of Procurement & Maintenance of HDDs

2.8 Recording Heads Market

- 2.8.1 Declining Head-to-Drive Ratios

2.9 Media Market

2.10 The Emerging Consumer Electronics Market

- 2.11 Sizing the HDD Opportunity in Non-Traditional Markets**
- 2.12 Hard Disk Drive Company Activity in Non-Traditional Markets**
 - 2.12.1 Maxtor
 - 2.12.2 Seagate
 - 2.12.3 Fujitsu
 - 2.12.4 Western Digital

3 MARKET, PRODUCT & BUSINESS REQUIREMENTS

- 3.1 Hard Disk Drive Demand**
- 3.2 Hard Disk Drive Market Challenges**
- 3.3 The Increasing Importance of the PC OEMs**
- 3.4 Pricing Trends**
 - 3.4.1 Contractual Terms & Conditions
 - 3.4.2 Payment Terms
 - 3.4.3 Transportation
 - 3.4.4 Warranty, Cancellation Policies
- 3.5 Warehousing**
 - 3.5.1 JIT Hubs
 - 3.5.2 Achieving 50-125 Inventory Turns
 - 3.5.3 Cost of Storing Inventory/Moving Goods
- 3.6 Quality/Failure Criterion**
 - 3.6.1 Factory Level PPM
 - 3.6.2 Field Level PPM
 - 3.6.3 Prevalent OEM Terms & Conditions by Major Disk Drive Vendors

4 HDD, CD, DVD PRICING - OEM, DISTRIBUTION & STREET

- 4.1 Industry (OEM, Disty, Street) Pricing by Product Lines**
 - 4.1.1 HDD by quarter 1997-2002
 - 4.1.2 CD, CDRW, DVD 1997-2002
- 4.2 HDD Rigid Disk Drives Market Trends**
 - 4.2.1 2.5" Mobile IDE HDD
 - 4.2.2 3.5" Desktop IDE HDD
 - 4.2.3 3.5" Enterprise SCSI HDD
- 4.3 Lowest HDD OEM Prices 1998-2002 by Month**
 - 4.3.1 by Vendor Groups
- 4.4 CD/DVD Optical Disk Drives Market Trends**
 - 4.4.1 CDROM Mobile
 - 4.4.2 CDROM Desktop
 - 4.4.3 CDRW Mobile
 - 4.4.4 CDRW Desktop
 - 4.4.5 DVD Mobile
 - 4.4.6 DVD Desktop

4.5 Lowest CD/DVD OEM Price 1998-2002 by Month

4.5.1 by Vendor Groups

5 MARKET FORECAST & MARKET SHARES

5.1 Hard Disk Drive Demand

5.2 Hard Disk Drive Market Challenges

5.3 The Increasing Importance of the PC OEMs

5.4 HDD Market Share Roll-Up

5.5 Global Hard Drive Market Share (in Units)

5.6 Disk Drive Share Segmented by Form Factor

5.6.1 Desktop Market Share (Units)

5.6.2 Mobile Market Share (Units)

5.6.3 Enterprise Market Share (Units)

5.7 Worldwide HDD Shipments by Segment

5.8 Worldwide HDD Revenue by Segment

5.9 Worldwide HDD Revenue by Segment

5.10 Worldwide HDD ASP by Segment

5.11 WW HDD Revenues by Drive Capacity 1998-2002

6 ENABLING TECHNOLOGIES REVIEW

6.1 Technology Perspective

6.2 Technology Advancements

6.3 Trends - Areal Density Increases Are Accelerating

6.4 Areal Density Achievements 1975-2002

6.4.1 Areal Density Achievements

6.5 Future of Disk Drive Interfaces

6.5.1 Making Connections

6.5.2 Why Ultra160, Ultra 320?

6.5.3 The Lowdown on LVDS

6.5.4 Any major market for Firewire 1394?

6.5.5 The PCI Bus Eliminates the Next Bottleneck

6.5.6 Fibre Channel vs. SCSI

6.5.7 Emerging Interfaces – Serial ATA, Serial SCSI, iSCSI

6.6 IDE vs. SCSI vs. FC

6.7 SCSI Roadmap 1985-2005

6.7.1 From 50-pin to 80-pin SCA, Differential Nomenclatures

6.7.2 Narrow 5 MBS to Ultra-640 MBS SCSI Migrations

6.8 OLTP performance Enhancements

6.9 Trends - Rotational Speed Increases

6.9.1 Desktop Drive Transition

6.9.2 Enterprise Drive Transition

6.10 Other Technology Advances

6.11 The Horse Race of New Product Introductions

6.11.1 Mobile Product Announcements

6.11.2 Desktop Product Announcements

6.11.3 Enterprise Class Product Announcements

7 MAJOR SUPPLIERS - COMPETITIVE POSITIONING

7.1 Industry Update

7.2 Executive Summary

7.3 Vendor Shipment Updates

7.4 Hard Disk Drive Vendors - Revenues & Units 1998-99

7.5 Toshiba HDD

7.5.1 Product outlines

7.6 Toshiba CD-DVD

7.6.1 CD-RW/DVD

7.7 Conner Technology

7.8 Fujitsu

7.9 Hitachi HDD

7.10 Hitachi CD-DVD

7.10.1 History

7.10.2 Recording Format

7.10.3 Summary of Wobbled Land and Groove Format, Wobble-linked ID Detection

7.10.4 Sector Format – Sector & Header

7.10.5 Data Structure and Defect Management

7.10.6 Overwrite Reliability Methods

7.10.7 Summary

7.11 Sony CD-DVD

7.11.1 Summary – Sony Co, Products

7.11.2 CD-ROM Technology, Industry Compatibility

7.11.3 CD Recordable (CD-R) Technology & Compatibility

7.11.4 CD Recording Software

7.11.5 CD-ReWritable (CD-RW) Technology & Compatibility

7.11.6 CD-RW Recording Software

7.11.7 DVD-ROM, RAM and RW Technologies

7.11.8 DVD RW Alliances & Sony's Status

7.12 Panasonic CD-DVD

7.13 IBM

7.13.1 History

7.13.2 Merged read/write head- A proven design

7.13.3 Magnetic recording process

7.13.4 MR and GMR sensor technology

- 7.13.5 MR & GMR sensor basics
- 7.13.6 GMR sensor basics
- 7.13.7 Extension of GMR beyond 10 Gbits/in²
- 7.13.8 Manufacturing considerations- MR head experience pays off
- 7.13.9 Summary

7.14 Quantum HDD

- 7.14.1 Introduction - 8.4 GB Barrier
- 7.14.2 Executive Summary
- 7.14.3 Traditional Addressing
- 7.14.4 Extended INT 13 and LBA Addressing
- 7.14.5 New Systems
- 7.14.6 Installed Base of Systems
- 7.14.7 Operating System Limits
- 7.14.8 For Windows 95 or Windows 3.1
- 7.14.9 For DOS (under Windows)
- 7.14.10 Ultra SCSI to Fibre: The Preferred Performance Path
- 7.14.11 The Switch to Serial Interfaces
- 7.14.12 Summing up FC-ALs Advantages
- 7.14.13 In Summary

7.15 Seagate

- 7.15.1 MP3 Brings High Capacity Disc Drives into the HomeT
- 7.15.2 The Emergence of Reliability Prediction Technology
- 7.15.3 The evolution of S.M.A.R.T
- 7.15.4 Some failures are predictable, and some are not
- 7.15.5 How attributes are determined
- 7.15.6 The two S.M.A.R.T. specifications
- 7.15.7 An ounce of prevention is worth a pound of cure
- 7.15.8 10,000 RPM: SHIFTING THE REDLINE ON PERFORMANCE
- 7.15.9 Faster is Better
- 7.15.10 Welcome to the Next Level
- 7.15.11 Higher RPM Truly Makes a Difference
- 7.15.12 The Drive Ain't Latent
- 7.15.13 Delivering Top Performance
- 7.15.14 Keeping Everything Cool
- 7.15.15 Seagate: A Natural Leader in Data Technology

7.16 Samsung

7.17 What's New

- 7.17.1 Fujitsu
- 7.17.2 Hitachi
- 7.17.3 IBM
- 7.17.4 Maxtor

7.18 Quantum

7.18.1 7.23.1. Corporate Press Kit

7.18.2 7.23.2. Product Press Kits

7.19 Quarterly Earnings

7.19.1 Latest Press Releases

7.20 Samsung

7.21 Seagate

7.22 Western Digital

8 CHANNELS OF DISTRIBUTION

8.1 Industry Structure

8.2 Major Channels of Distribution

8.3 Channels of Distribution by EU Business Size

8.4 Distributor Programs

8.5 Build-to-order and Drop Ship Programs

8.5.1 Configuration and Assembly Services

8.5.2 Factory to Customer Direct Model

8.5.3 Drop Shipping directly to VAR's customer under VAR's name

8.5.4 Expedited Shipping - Same-Day Delivery

8.6 OEM Programs

8.7 Reseller Programs

8.7.1 VAR Partner Programs

8.7.2 High Volume Reseller Programs

8.7.3 Retail and Direct Marketer Partner Programs

8.8 Business Partner Marketing Program

8.8.1 Channel Marketing Management

8.8.2 Business Partner Startup Kit

8.8.3 Public Relations Visibility

8.8.4 Corporate Logo Usage Guidelines and Electronic Logo

8.8.5 Seminar in a Box Program & Seminar Support

8.8.6 Direct Mail Campaigns

8.8.7 Quarterly Newsletter

8.8.8 Tradeshow and Event Participation

8.8.9 Lead Distribution

8.8.10 Co-op Marketing Program

8.9 Targeted Markets Programs

8.9.1 Government Reseller Program with emphasis on post 9/11 security.

8.9.2 Emerging Third World Markets Programs

8.9.3 College Book Store Program

8.10 Distributor Services

8.11 Broad Product line

8.12 Financial & Credit Services

8.13 Add-on Services for Profit

8.13.1 Network Services

8.13.2 Software Licensing Programs

8.14 Interactive Electronic Tools Services

8.14.1 Electronic Commerce

8.14.2 End-User Printed & Electronic Catalogs

8.15 Marketing Services

8.15.1 Tech Expos

8.15.2 Prepaid Tech Support Cards

8.15.3 Training

8.15.4 Technical Support Services

8.16 Major Channel Players

8.17 Top OEMs

8.18 Top 50 Distributors

8.19 Top 50 System Integrators

8.20 Top 50 VARS

8.21 Top 75 VADS

9 RESEARCH METHODOLOGY & SOURCES

9.1 Company Data & Financials

9.2 Product Data

9.3 Pricing Data

9.4 Street Pricing

9.5 OEM Pricing

10 APPENDIX