2010
HARD DISK DRIVE
CAPITAL EQUIPMENT
MARKET & TECHNOLOGY
REPORT

COUGHLIN ASSOCIATES
SAN JOSE, CALIFORNIA

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2010-2015 Capital Equipment and Technology Report for the Hard Disk Drive Industry

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and

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INTRODUCTION

INTRODUCTION

Coughlin Associates is proud to publish this fourteenth report on capital spending trends in the hard disk drive industry.

Demand for traditional computer applications is growing but hard disk drives in mobile, low cost enterprise and consumer applications are experiencing the greatest growth of any market segment and will be in the majority of all hard disk drives by the next decade. This will result in a doubling in total drive unit shipments between 2010 and 2015. This increase in volume will drive capital equipment to sustain the manufacturing volume. Likewise the introduction of heat assisted magnetic recording (HAMR) and patterned media (DTR or PBM) will require purchase of new equipment and development of production processes although the difficulties in these technologies combined with the lack of a clear mandate to introduce one or the other technology in shipping products will delay significant spending on capital equipment to support these technology introduction until 2013-2015. These factors will cause unprecedented but controlled growth in the demand for production process equipment, production test equipment and metrology equipment.

This report explores the drivers for new HDD demand growth and sets expectations for the growth of production and process, production testing and metrology capital equipment. We will describe the changes in HDD technology and what that will require in terms of production and process equipment. We will look at developments in production test and metrology driven by the need to minimize the impact of test on total drive and component cost as well as increasing drive yields and reliability.

Some highlights on the report methodology are:

- Accuracy of final data is about +/-15%
- Analysis is based on top-down (customer spending trends) and bottom-up (vendor sales trends) from interviews with knowledgeable people in the industry
- Data forming the basis of the model was collected from a combination of public and private sources both domestic and abroad
- We checked revenue/spending numbers with appropriate product pricing and volume calculations
- Future projections (through 2015) are based upon current trends and expected forthcoming developments (volume expansion and technology developments)
- We assume over 100% growth in disk drive volume (from about 670 M to 1.4 B) from 2010 to 2015
- We assume 225% growth in capital equipment spending from 2010 to 2015 driven by three factors
    - ⇒ Capital spending to meet new demand

⇒ Capital spending to meet new technology requirements such as HAMR and DTR

⇒ Capital spending to update facilities and processes

- We assume ~77% of HDD and component company total capital spending overall is on process equipment (remainder on facilities, infrastructure, etc.)

The particular manufacturing spending/revenues categories discussed here are drives; head wafers/sliders/HGAs; as well as disks and disk substrates. The spending in these categories is further broken down into spending/revenue for production process equipment, production testing equipment and metrology equipment. Production and process equipment includes basic assembly and manufacturing tools including automation, contamination control and manufacturing operations. Not included in production and process equipment spending is capital spending on building and basic facility expense such as DI water, gas lines, HVAC, etc. Production test equipment includes drive burn-in racks and testers, certifiers, contamination monitoring equipment as well as servo writers and equipment often classed as metrology equipment but which is used continuously or often on the production line. Metrology equipment refers to measurement equipment that generally not used on the production line, is used for failure analysis, gauging and standardization, AQL testing, etc.

We have identified in this report information from both captive and merchant test equipment suppliers. The distinction is important. Merchant suppliers are eager to garner more business from captive suppliers in order to grow their available market. However, captive suppliers in the past have felt that they are better able to tailor test solutions to specific requirements while controlling the technology and diminishing their reliance on outside suppliers. This make/buy decision continues to be a critical element affecting the fortunes of independent test equipment suppliers; however the general trend is to use more outside suppliers.

This report is based upon recent interviews and analysis as well as historical data from prior reports on capital spending by the author(s). Capital spending reported here is estimated to be within about 15% accuracy of total spending by HDD companies, their component suppliers as well as sub-suppliers. In the course of obtaining the information contained in this report we have contacted or visited many test and process equipment companies, most of the disk drive manufacturers, and several head, media, and sub-components suppliers. During our interviews we received information concerning forecasts, expected technology directions and future requirements. We wish to express our thanks to all who contributed their knowledge and foresight.

In compiling this report we have not included all the detailed data we have gathered. As usual if you have any questions or require additional information please contact us. We are open to provide information readily available to us (with due regard for the confidentiality of our sources) or develop it for you on a project basis.

THE AUTHORS

Tom Coughlin, President, Coughlin Enterprises: Tom Coughlin is a well known analyst, speaker and consultant in the digital storage and applications industry. He has over 50 publications and six patents to his credit and publishes regular reports on digital storage technology and applications, including this report. Tom is active with IDEMA, the IEEE Magnetics Society, IEEE CE Society, SNIA, and other professional organizations. Tom has been active with Region 6 IEEE including chairman of the 2011 IEEE Sections Congress. He is the founder and organizer of the Annual Storage Visions Conference, a partner to the annual Consumer Electronics Show as well as the Creative Storage Conference. Coughlin Associates provides market and technology analysis as well as Data Storage Technical Consulting services. For more information go to www.tomcoughlin.com

Ed Grochowski, Computer Storage Consultant: Ed Grochowski is a well known speaker on storage technology. He has a 50-year career association with the computer industry, 41 of which were with IBM. Ed worked at the IBM Almaden Research Center where his interests included hard disk drive and component evolutionary trends. Ed's charts are frequently used to describe HDD and storage progress by numerous industry presenters at many conferences. He holds nine patents and has authored and presented numerous articles on HDD and component technology. Ed served as Executive Director of DISKCON and the Symposium series for many years. He was a long time coordinator of the 4K-byte sector standards committee, and is a member of the IEEE. For more information see http://edwgrochowski.com.

ACKNOWLEDGEMENTS:

This report is the result of extensive interviews and discussions with many people and companies including equipment suppliers as well as their HDD and HDD component customers. The list of companies contacted is extensive and the data we gathered is very comprehensive, not all of it is included in this report. Our thinking and projections were shaped by many inputs. In particular we would like to thank the following companies and organizations for their help and information: Adept, Datagate, Gary Davis Consulting, Guzik Technical Enterprises, Hutchinson Technology, Hitachi GST, Hitachi High Tech, Intevac, KLA Tencor, Lighthouse Solutions, Molecular Imprints, Pall Filters, Park Instruments, Polytec PI, TDK,/SAE, Samsung, Seagate, Toshiba, Veeco, Western Digital, Xyratex, and many others.

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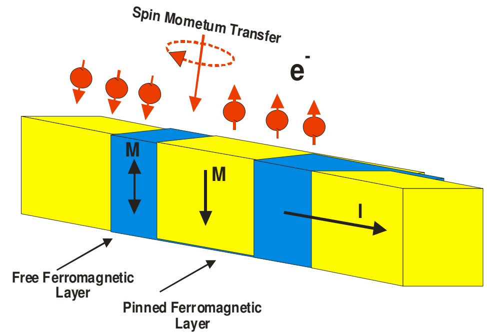

2010 Hard Disk Drive Capital Equipment and Technology Report

Coughlin Associates announces the publication of our latest detailed report addressing technology developments and world-wide capital spending projections from 2010 through 2015 for the hard disk drive industry. Purchase of the PDF report gives company-wide access as well as a copy of a powerpoint document with all report figures and tables. Order your copy today and get a free subscription to the Digital Storage Technology Newsletter!

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