

DiskMapper H7 System

Full Disk Rapid Magnetic characterization of HAMR/TAR perpendicular media



The DiskMapper H7 system quickly determines the uniformity of the perpendicular recording layer of Heat Assisted Magnetic Recording (HAMR), also called Thermally Assisted Recording (TAR) disks, immediately after deposition, an important factor in the yield of disk drives. Utilizing a custom 7 Tesla bi-polar high speed superconducting magnet, the hysteresis loop of any disk location can be measured in less than 3 minutes. By using full cassette automation and double-sided measurement capability, the DiskMapper H7 system is both an R&D and production tool.

BENEFITS

- Non-destructive, non-contact double-sided mapping of the magnetic properties of HAMR/TAR media.
- Rapid process feedback enhances control of the deposition process, measuring H_c , H_n , S , S^* and other key properties of the recording layer.
- High-throughput ± 7 Tesla production tool with automated cassette handling.
- Disk Heat option allows temperature-dependent measurements.
- Choice of high sweep rate 7 Tesla or lower cost 7 Tesla magnet.

MAGNETIC CHARACTERIZATION

The DiskMapper H7 system automatically generates a map of the magnetic properties of the disk (Figure 1). The number and location of measurement points and the maximum applied field are user-settable and can be saved in recipe files. The system can simultaneously measure a ± 7 Tesla hysteresis loop on both sides of the disk within less than 3 minutes.

The DiskMapper H7 system is capable of characterizing advanced HAMR/TAR media, utilizing a user-programmable sweep rate and a maximum applied field of ± 7 Tesla, exceeding any current requirements and allowing for future generations of HAMR/TAR PMR media.

USER SELECTABLE MAGNETS AND OPTIONS

The System is available configured with either a lower cost or a high performance ± 7 Tesla Superconducting magnet. Double-sided measurement capability and disk heat option can be purchased at time of order or as field upgrades.

PROCESS CONTROL

The system simultaneously measures full hysteresis loops on both sides of the media and can automatically extract H_c , H_n , S and S^* and many other industry-standard parameters (Figure 2). The mapping results are displayed both graphically and in tables and can be saved to a network drive.

USER INTERFACE DATA PORTABILITY

The user interface and data format of the DiskMapper H7 system is identical to that of the industry-standard MicroSense Polar Kerr System, making the metrology transition to the DiskMapper H7 system seamless. All data can be exported in ASCII format, allowing the DiskMapper software to integrate seamlessly with many analysis programs, such as Excel, MatLab and industrial statistical process control software packages. The operating software runs under Windows 7 (or later) providing the highest level of software security.

MULTI-LEVEL USER MANAGEMENT

The DiskMapper H7 system has two modes of operation. A production mode provides a simple start/stop type interface, using a recipe as determined by the process engineer. The number and location of measurement points, maximum field, and selection of output parameters are all user-specifiable during recipe creation (Figure 3). In the password-protected engineering mode, measurement sequences can be modified without affecting production mode. A broad range of analytical and diagnostic tools are available to provide feedback to the media deposition process.

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MACRO PROGRAMMING CAPABILITY

The optional macro programming software module allows the creation of complex measurements (Figure 4). Building blocks provided in this module include looping structures, the definition of sub-macros and programmatic access to all hardware components of the tool.

DATA ANALYSIS

The DiskMapper H7 software includes a powerful data analysis module (Figure 5). This built-in analysis capability enables visualization of saved data. In addition, many data manipulation functions are provided to allow post-processing of measurement data. Manipulated results can be exported or saved in the same way as raw data.

SUMMARY

By quickly and accurately measuring the magnetic parameters crucial to HAMR/TAR PMR media production, the DiskMapper H7 system improves the ability to keep the deposition process under control. The full disk, non-contact measurement technique and automated handling make the DiskMapper H7 system essential for production use and yield improvement.

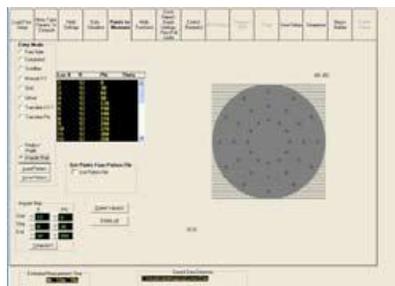


Figure 3. Easy-to-use GUI for recipe creation.

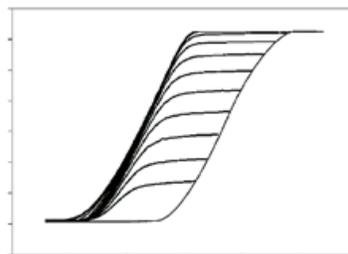


Figure 4. Recoil loop measurements and other complex measurements may be programmed using the macro language module.

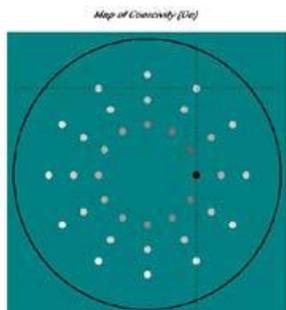


Figure 1. Gray-scale map of recording layer H_c .

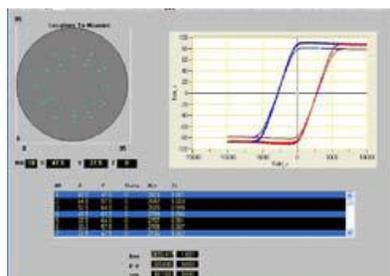


Figure 5. Typical screen shot of offline data analysis.

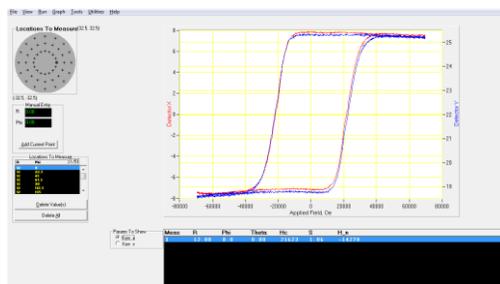


Figure 2. Mapping results can be displayed in both graphical and tabular format.