

# Programmable Data Density (PDD) for High Throughput Feature Measurement



For more information: info@parkAFM.com www.parkAFM.com

Nanotechnology Solutions Partner

## Park Systems, the Nanotechnology Solutions Partner for HDD Industry

Park Systems serves the hard disk drive (HDD) industry with automated nanotechnology measurement solutions including atomic force microscopes, software, and global service and support. Partnering with world leaders in HDD industry, Park Systems has been successfully delivering optimized solutions for the most challenging imaging and measurement needs in the industry.

The company's HDD-Optimize program is a state-of-the-art nanotechnology solutions service for the hard disk drive industry. Under the systematic approach of the program, Park Systems ensures rapid alignment and performance of the XE nanotechnology measurement platform with the specific requirement of its customers.

## Limitations in Current Method of Slider Metrology

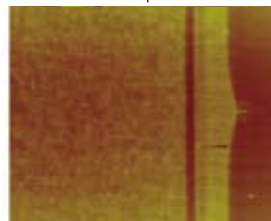
Reference Scan @ ABS



Need to take a separate image to compensate for background curvature

Tact time: ~5min

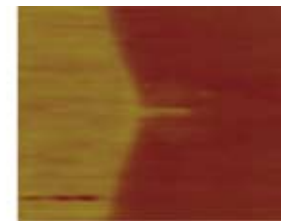
Pole Tip Scan



Not enough pixel resolutions for small region of interest, i.e. writer pole

Tact time: ~5min

Writer Pole Scan



Manual search and find of small region of interest for high resolution imaging

Tact time: ~30min

### ● Low Measurement Throughput : One Writer Pole Image takes ~40 minutes

- ✓ Labor intensive manual process
- ✓ High labor cost

## Going Beyond Conventional PTR Measurements

### The overall mechanical characterization of sliders now involves

- A variety of metrology systems and
- A variety of resolution requirements

In order to improve yield and reliability of slider manufacturing, one has to go beyond conventional PTR measurements

**Answer: Programmable Data Density**

## XE-PTR: For In-line Pole Tip Recession Metrology of Hard Disk Sliders

Continuing the company's impressive track record of developing optimized solutions, Park Systems introduces XE-PTR, an automatic AFM which revolutionizes the way sliders in HDD are imaged and analyzed. The new XE-PTR significantly increases accuracy and throughput for the slider's pole tip recession imaging process with the innovative Programmable Data Density (PDD) capability.



### Inline Automation

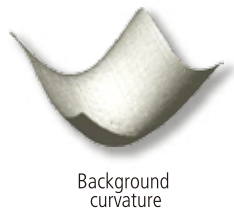
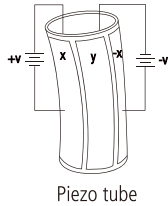
- Automatic Data Acquisition and Analysis of Sliders
- Allowable Sample Types: Rowbars, Sliders
- Artifact Free Metrology by Crosstalk Elimination
- Longer Tip Life by True Non-Contact Mode
- High Throughput Feature Measurement by PDD
- Automatic Tip Exchange (Optional)
- HGA Sample Fixture (Optional)

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## Current Limitations of Conventional AFM

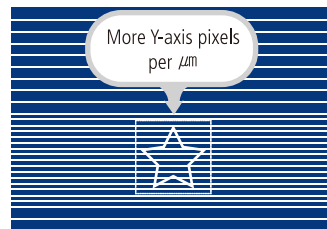
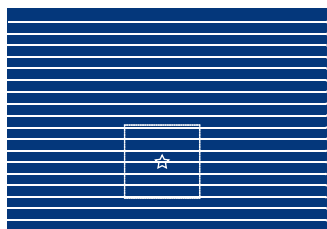


- Piezo tube is not an orthogonal 3-D actuator (scanner bowing)
- Non-Contact Mode not possible due to slow z-servo response
- Measurement throughput is prohibitively limiting

## What should we do?

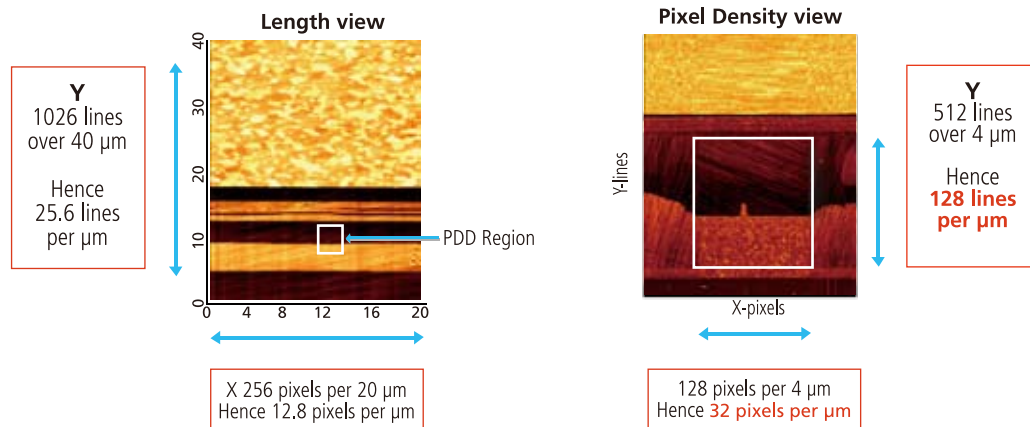
- New AFM platform to eliminate intrinsic hysteresis and non-linearity of piezotube
- New AFM platform to improve Z-servo bandwidth to enable non-contact mode
- New AFM platform to enable smart algorithm to scan sample features of interest

## The Programmable Data Density (PDD) Overcomes the Challenges



- 2-Zone PDD (more pixels for both X and Y-axis) is realized!
- Imaging of variable pixel density for the region of interest
- Automatically detects the region of interest

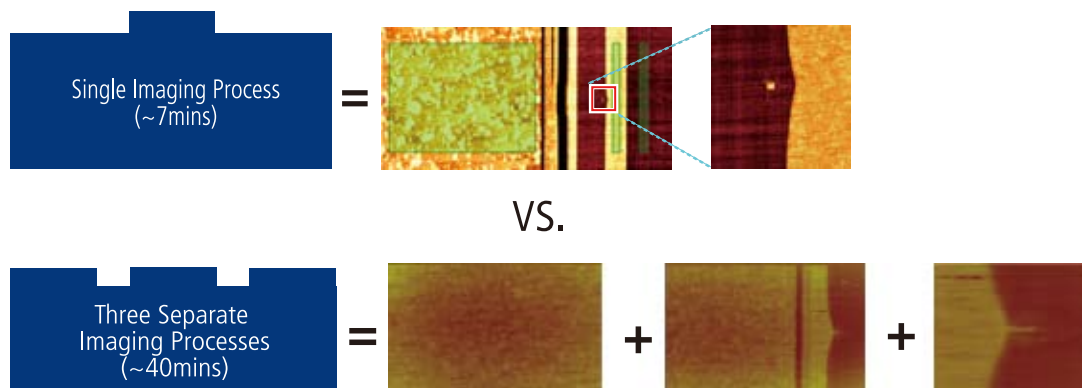
## 2-Zone PDD for Writer Pole



Enables high resolution imaging of small region in one scan.

## Result: Single 2-Zone PDD PTR Measurement

## Park AFM vs. Conventional AFM



The Ultimate Improvement in throughput (more than 400%)!!!  
Obtains PTR, writer pole, and other features in All-in-One image scan