



The Most Accurate Atomic Force Microscope

# Park NX-Hivac

The world's most accurate and easy to use  
high vacuum AFM for failure analysis

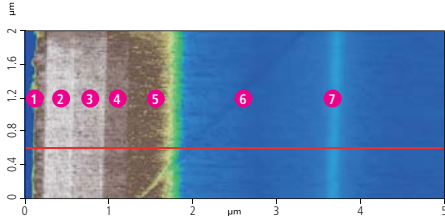
[www.parkAFM.com](http://www.parkAFM.com)

*Park*  
SYSTEMS

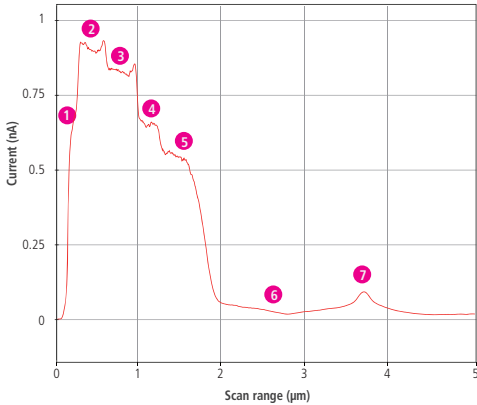
# Park NX-Hivac

High vacuum scanning for failure analysis applications

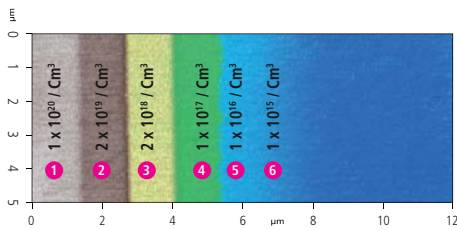




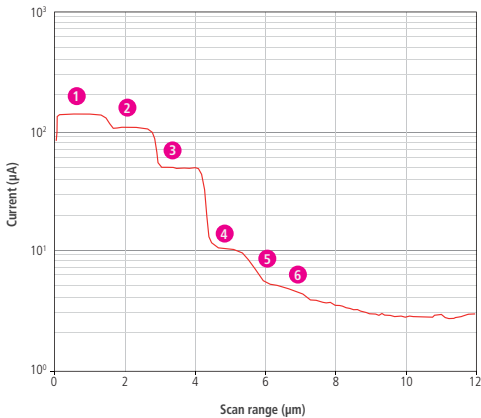
Line profile



SSRM image of calibration stair sample (N type)



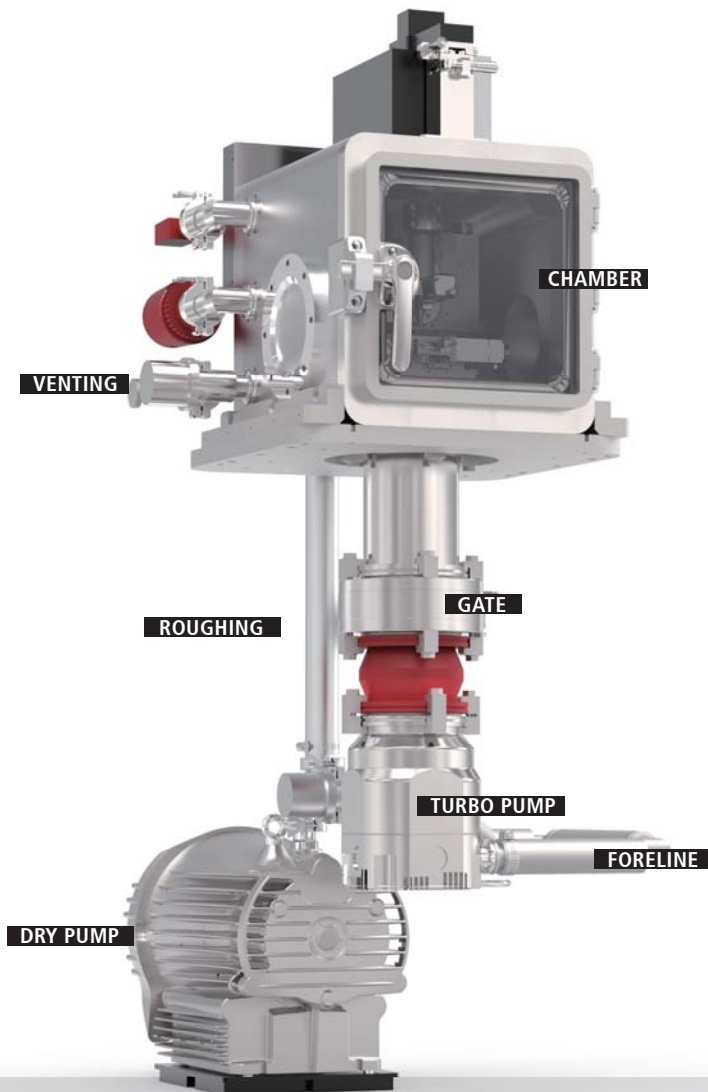
Line profile



SSRM image of calibration stair sample (P type)

Park NX-Hivac allows failure analysis engineers to improve the sensitivity and resolution of their measurements through high vacuum SSRM. Because high vacuum scanning offers greater accuracy, better repeatability, and less tip and sample damage than ambient or dry N<sub>2</sub> conditions, users can measure a wide range of dope concentration and signal response in failure analysis applications.

Performing SSRM measurements under high-vacuum conditions can reduce the required tip-sample interaction force, which can significantly reduce damage to both the sample and the tip. This will extend the life of each tip, making scanning cheaper and more convenient, and can provide more accurate results by improving spatial resolution and signal to noise ratio. This makes high vacuum SSRM measurements conducted with the NX-Hivac an excellent choice for failure analysis engineers looking to increase their throughput, reduce costs, and improve accuracy.



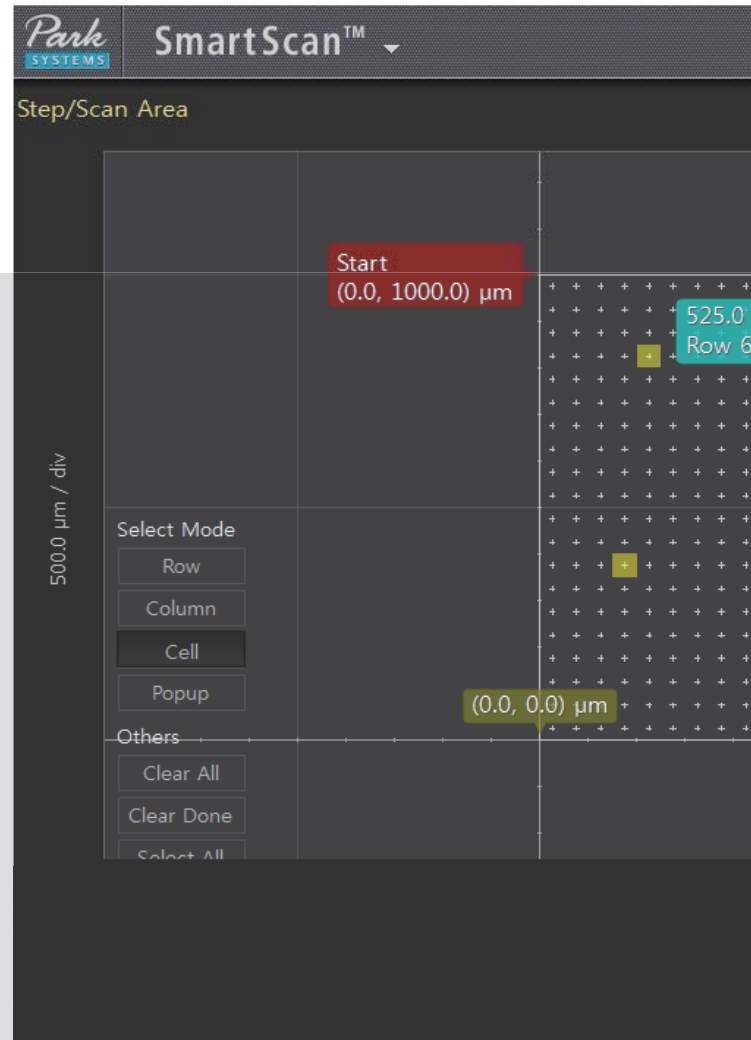
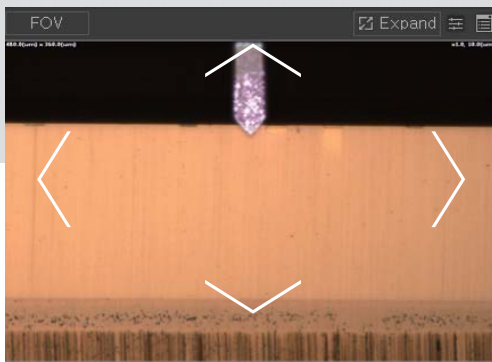
# Park NX-Hivac

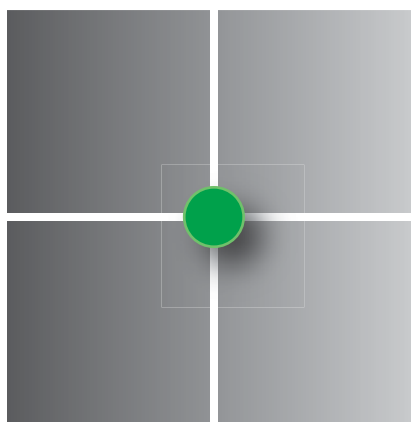
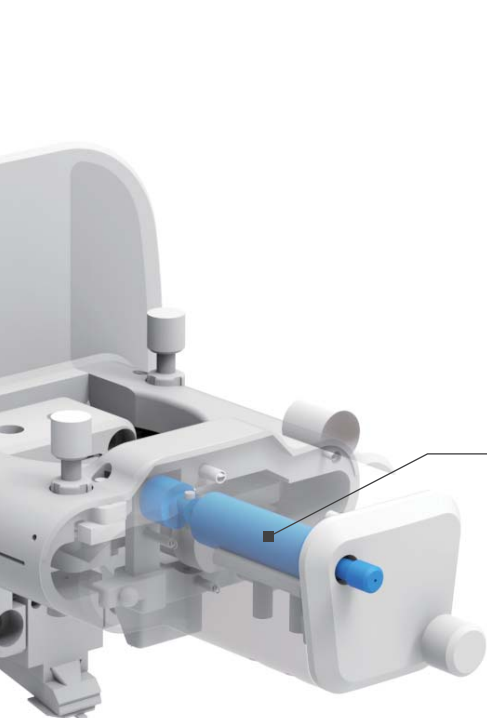
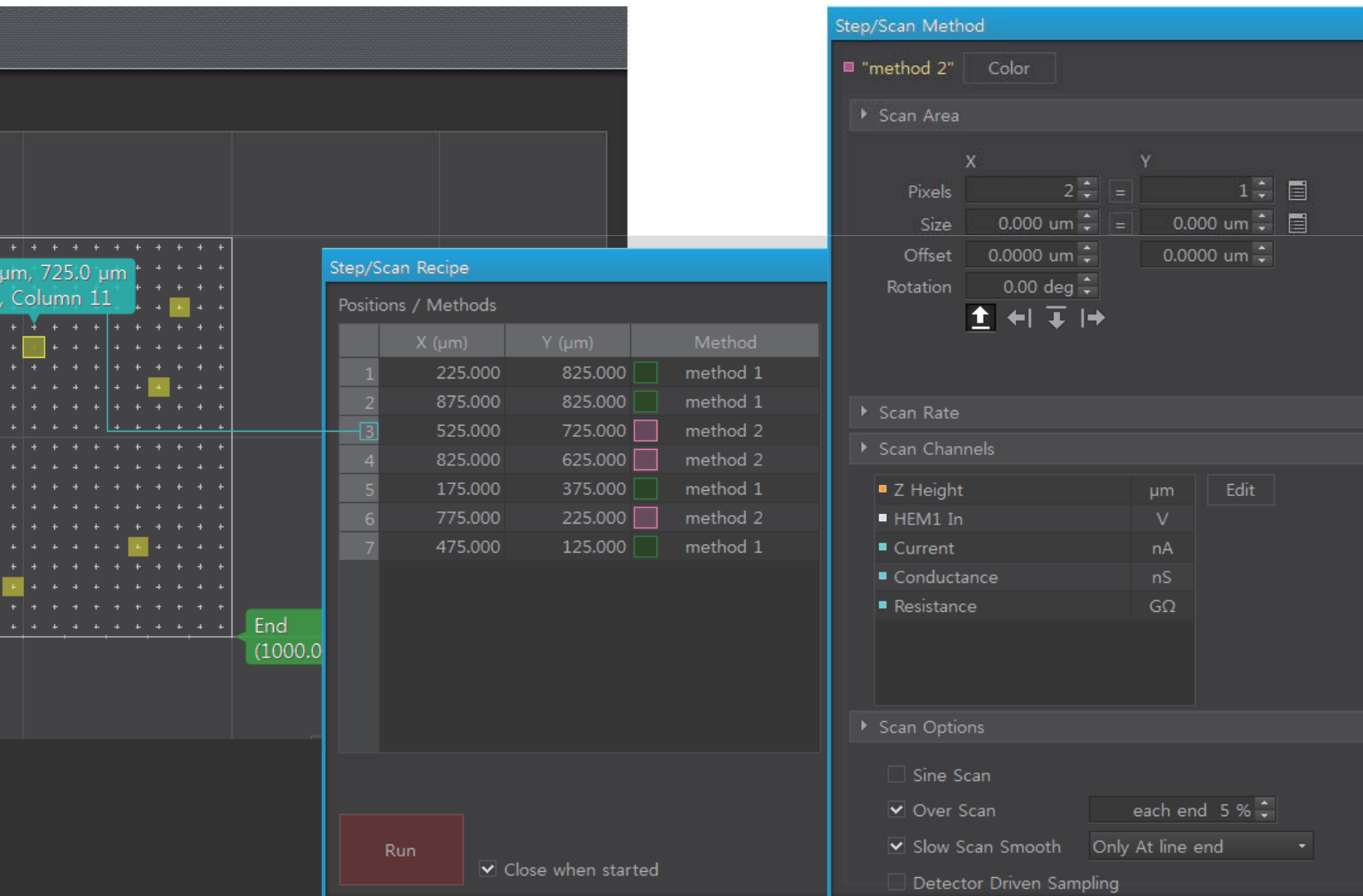
## Advanced automation features

The NX-Hivac features a range of tools that minimize the required input from the user. This means you can scan faster and increase your lab's throughput.

### StepScan Automation with Motorized stage

StepScan gives users the ability to program the device to image multiple regions quickly and easily. The NX-Hivac lets you scan a sample in just five steps: Scan, lift cantilever, move motorized stage to user defined coordinate, approach, and repeat. This boosts productivity enormously and reduces required user input to the absolute minimum.





### Motorized laser alignment

Park's motorized laser beam alignment lets the user seamlessly continue automated measurement routines without user input. With our advanced pre-aligned cantilever holder, the laser beam is focused on the cantilever upon tip exchange. The laser spot is then optimized along the X- and Y-axis by motorized positioning knobs.

### Dovetail-lock mount

The AFM head can be quickly and easily secured onto the dovetail rail with a positioning repeatability of a few microns.



### Multi-sample chuck

The magnetic chuck can hold up to five separate samples. This improves productivity by reducing the need to activate the vacuum pump and vent.



### Large Vacuum Chamber

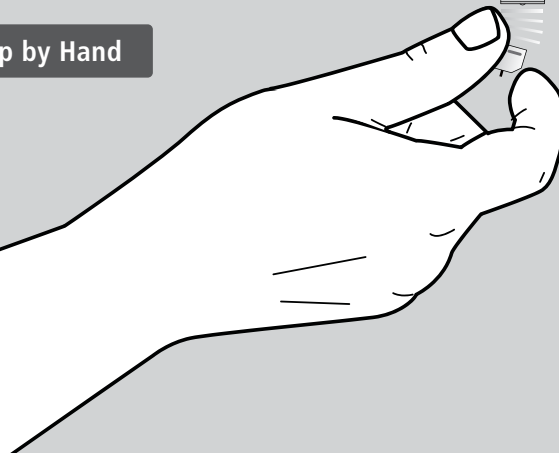
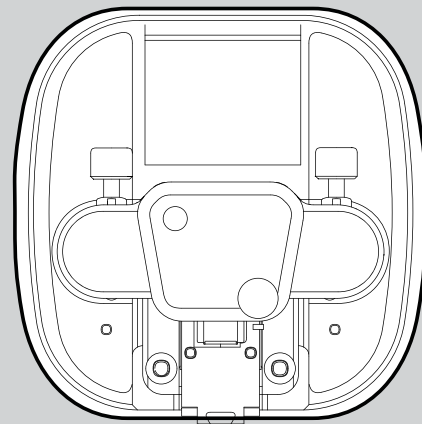
The NX-Hivac features a chamber size of 300 mm X 420 mm X 320 mm, allowing users to scan more samples sizes and put more samples into the unit without breaking the vacuum seal.

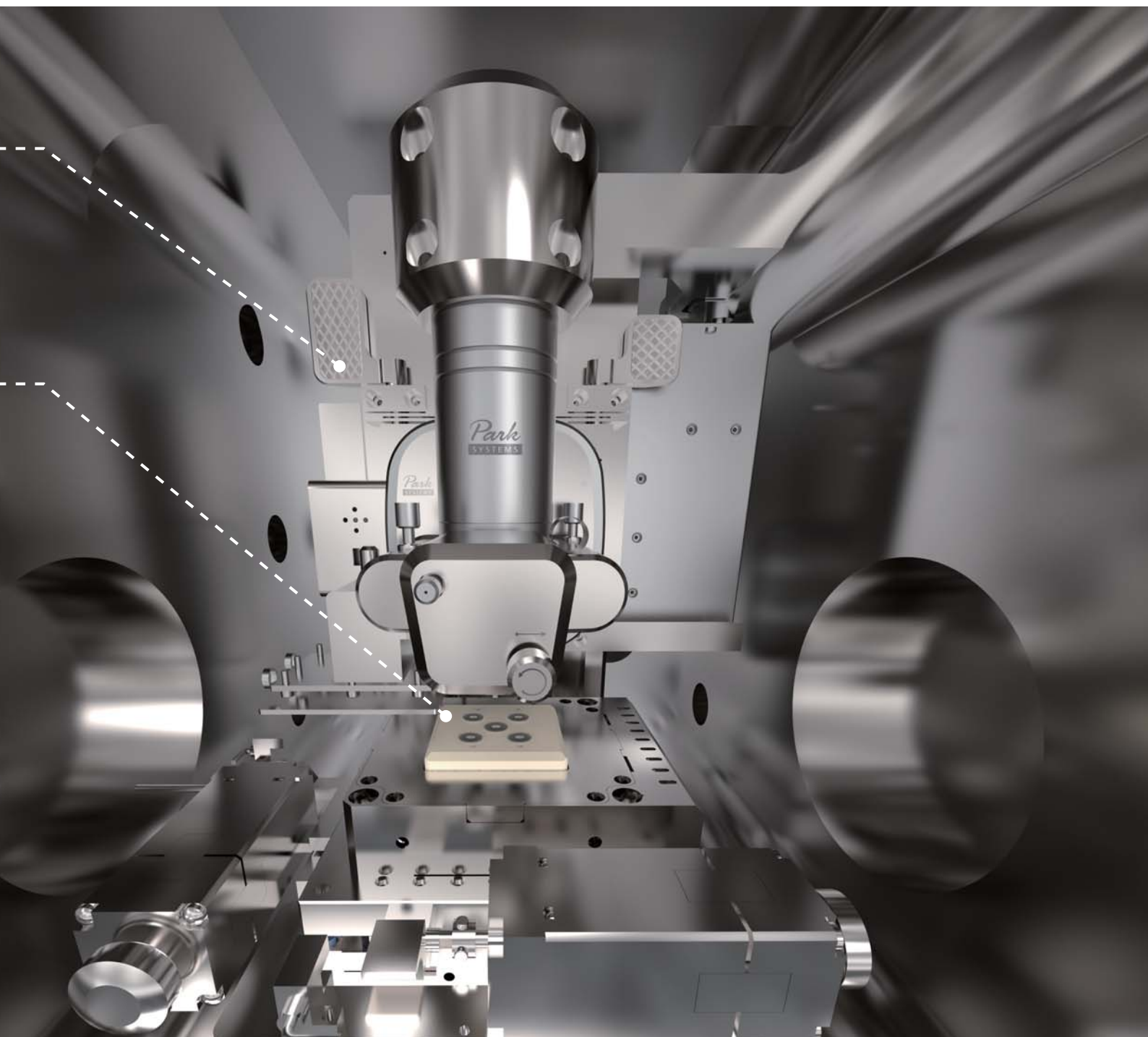
### Easy Tip and Sample Exchange

The unique head design allows easy side access allowing you to easily snap new tips and samples into place by hand. The cantilever is ready for scanning without the need for any tricky laser beam alignment by using pre-aligned cantilevers mounted on to the cantilever tip holder.



Easy Snap by Hand





## **Park NX-Hivac**

### **Designed for productivity**

The NX-Hivac has several usability features that make it more convenient and effective than other leading AFMs.

# Park SmartScan™

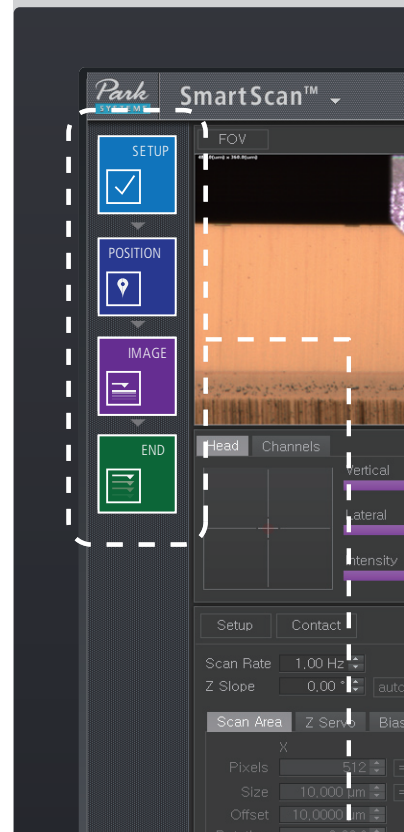
## World's easiest to use AFM operating software

Whether your AFM needs are focused on academic research, industrial metrology or failure analysis, NX-Hivac's SmartScan Auto mode offers a streamlined system to generate publishable high quality AFM data. Moreover, SmartScan promises productive session with an AFM even for beginners to obtain quality data as good as an expert's, in much shorter time.

## Park Hivac Manager

### NX-Hivac auto vacuum control

High vacuum is controlled by Hivac Manager, pumping for the optimized vacuum condition and venting processes are logically and visually controlled by one-button clicking. Each process is visually monitored by color and schematic changes, you would not need to worry about the sequence of vacuum operation after click on a button. Faster and easier vacuum control software brings you ease of use AFM operation and better productivity.



**Park Hivac Manager**  
NX-Hivac auto vacuum control

Status: **Connected**

Controls: **Auto** | Manual

Pumping | Venting

Event Log

| when     | description                                 |
|----------|---|
| 12:02:06 | Turn On Dry Pump Fan                        |
| 12:02:06 | Turn On Turbo Pump Fan                      |
| 12:02:06 | Open Roughing Valve                         |
| 12:02:07 | Open Foreline Valve                         |
| 12:02:09 | Start Dry Pump                              |
| 12:02:10 | Waiting for pressure dropped below 0.150... |
| 12:04:23 | Start Turbo Pump                            |
| 12:04:25 | Waiting for turbo pump started              |
| 12:05:40 | Close Roughing Valve                        |
| 12:05:43 | Open Gate Valve                             |

Started at 2015/06/23 11:58:47

## Automatic vacuum pumping and venting



OPENED



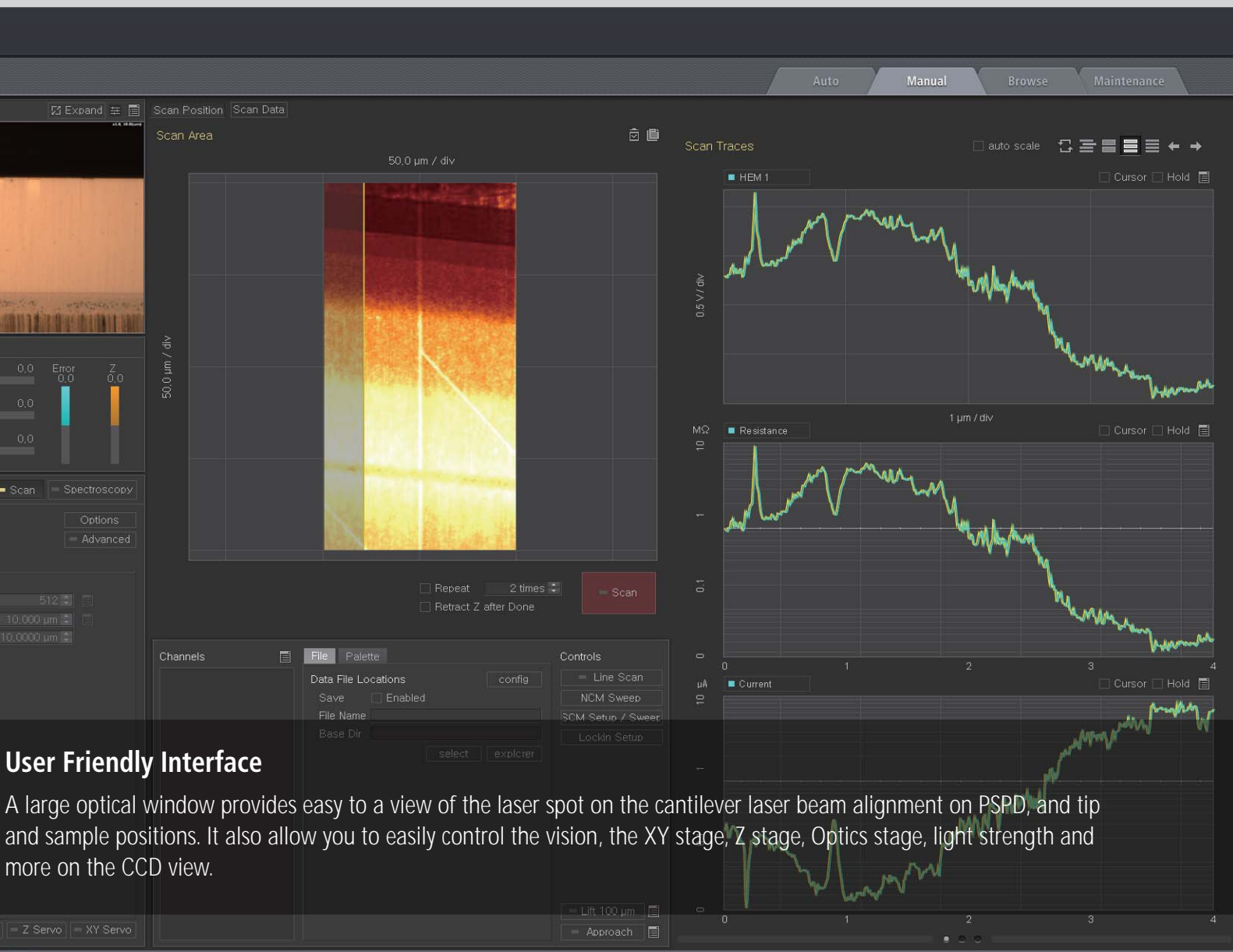
CLOSED



GAUGE SENSOR

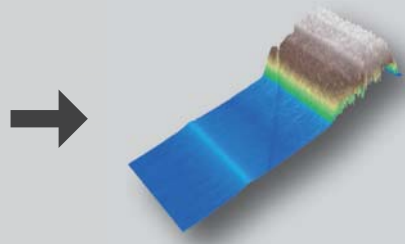
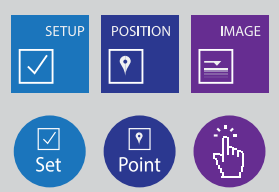
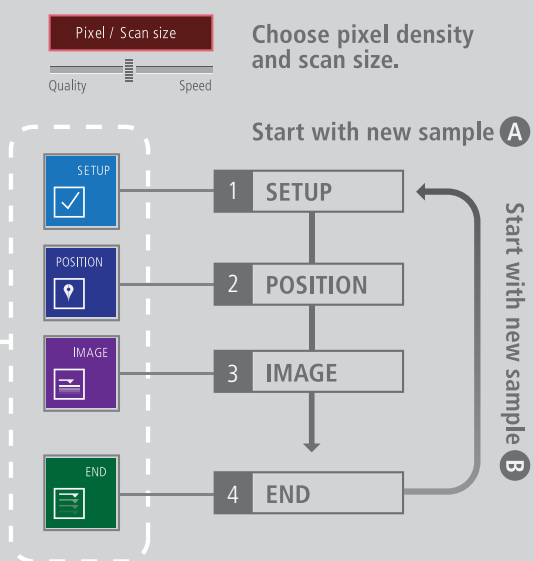
The NX-Hivac lets users set up automatic controls for vacuum pumping and venting, further streamlining the scanning process and reducing required human input. The average pumping speed is to about  $10^{-5}$  torr in  $< 5$  min using Turbo and Dry Pump.





## User Friendly Interface

A large optical window provides easy to a view of the laser spot on the cantilever laser beam alignment on PSPD, and tip and sample positions. It also allow you to easily control the vision, the XY stage, Z stage, Optics stage, light strength and more on the CCD view.



## Single-Click Imaging with SmartScan™ Auto Mode

All you need to specify for AFM imaging are quality-speed preference, pixel density and scan size. Outside of those factors, you can leave all sophisticated AFM parameters up to the Auto mode of SmartScan. The system will start a measurement with optimized conditions for imaging automatically at the click of a button.

# Park NX-Hivac

## Increasing accuracy and productivity

Although the NX-Hivac is the world's most accurate high performance AFM, it is also one of the easiest to use and convenient AFMs for failure analysis applications. With Park NX-Hivac, you can increase your productivity and trust that your results are sound.

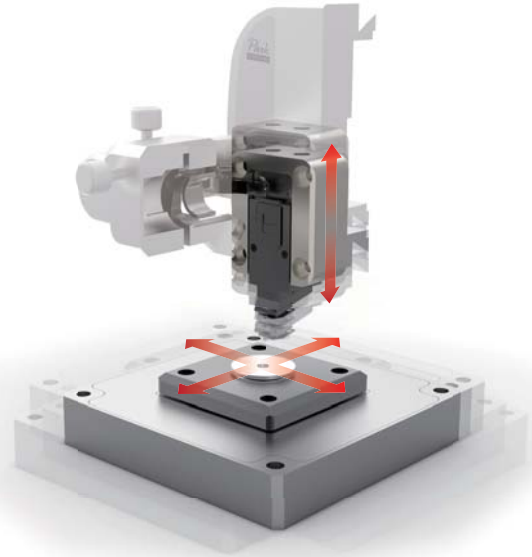
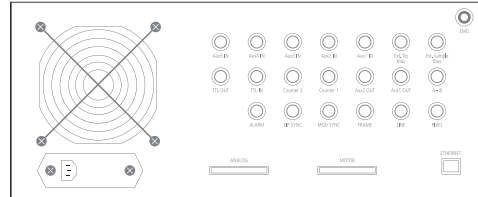
### Closed-loop XY and Z Scanners

With two independent closed-loop XY and Z flexure scanners for the sample and probe tip, you can rest assured that your scans will be extremely accurate. The NX-Hivac offers flat and orthogonal XY scanning with low residual bow, offering out of plane motion less than 1 nm over the entire scan range. The NX-Hivac also features a high speeds Z scanner with a 15  $\mu\text{m}$  scan range and Z scanner non-linearity is less than 0.5%. This provides accurate 2D and 3D measurements with no need for software processing.



## Low Noise XYZ Position Sensors

The NX-Hivac features Park AFM's industry leading low noise Z detector that can accurately measure sample topography while the low noise XY closed loop scan minimizes the forward and backward scan gap to less than 0.15% of the scan range.



## 24-bit Digital Electronics

Minimize wasted time and maximize accuracy with the trademark NX-Series electronics controller featured in the NX-Hivac. Our controller is an all digital, 24-bit high speed device which gives the user the ability to perform a wide range of scans including our True Non-Contact mode. With its low noise design and high speed processing unit, the controller is ideal for precise voltage and current measurement as well as nano scale imaging. The embedded electronics also feature digital signal processing, allowing users to easily analyze measurements and imaging.

### SPECIFICATION

#### Scanner

**XY scanner:** 50  $\mu\text{m}$   $\times$  50  $\mu\text{m}$  (100  $\mu\text{m}$   $\times$  100  $\mu\text{m}$  optional)  
**Z scanner:** 15  $\mu\text{m}$

#### Optics

**Objective lens:** 10 x  
**5M pixel CCD**

#### Sample Stage

**XY stage travel:** 22 mm  $\times$  22 mm  
**Sample size:** 50 mm  $\times$  50 mm, up to 20 mm thickness

#### Physical Information

**Vacuum chamber (inner):** 300 mm  $\times$  420 mm  $\times$  320 mm  
**Vacuum chamber (outer including granite & pump):**  
 800 mm  $\times$  950 mm  $\times$  730 mm

#### Software

**SmartScan:** Park AFM operating software  
**XEI:** AFM data analysis software  
**Hivac Manager:** Auto vacuum control software

#### Electronics

**ADC:** 18 channels  
 4 high-speed ADC channels (50 MSPS)  
 24-bit ADCs for X, Y, and Z position sensor

#### High Vacuum

**Vacuum level:** Typically less than  $1 \times 10^{-5}$  torr  
**Pumping speed:** Reach to  $10^{-5}$  torr within 5 min.

**DAC:** 12 channels  
 2 high-speed DAC channels (50 MSPS)  
 20-bit DACs for X, Y, and Z positioning  
 3 channels of integrated lock-in amplifier

# Park Systems

Dedicated to producing the most accurate and easiest to use AFMs

The global headquarters is located at  
Korean Advanced Nanotechnology Center (KANC) in Suwon, Korea.



More than a quarter century ago, the foundations for Park Systems were laid at Stanford University where Dr. Sang-il Park, the founder of Park Systems worked as an integral part of the group that first developed AFM technology. After perfecting the technology, he then went on to create the first commercial AFM and later Park Systems was born.

Park Systems strives everyday to live up to the innovative spirit of its beginnings. Throughout our long history, we have honored our commitment to providing the most accurate and yet very easy to use AFMs, with revolutionary features like True Non-Contact™ mode, and many automated software tools. We are not simply content to rest on our past success. All of our products are designed with same care and creativity that went into our first, allowing you to focus on getting results without worrying about the integrity of your tools.



[www.parkAFM.com](http://www.parkAFM.com)

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