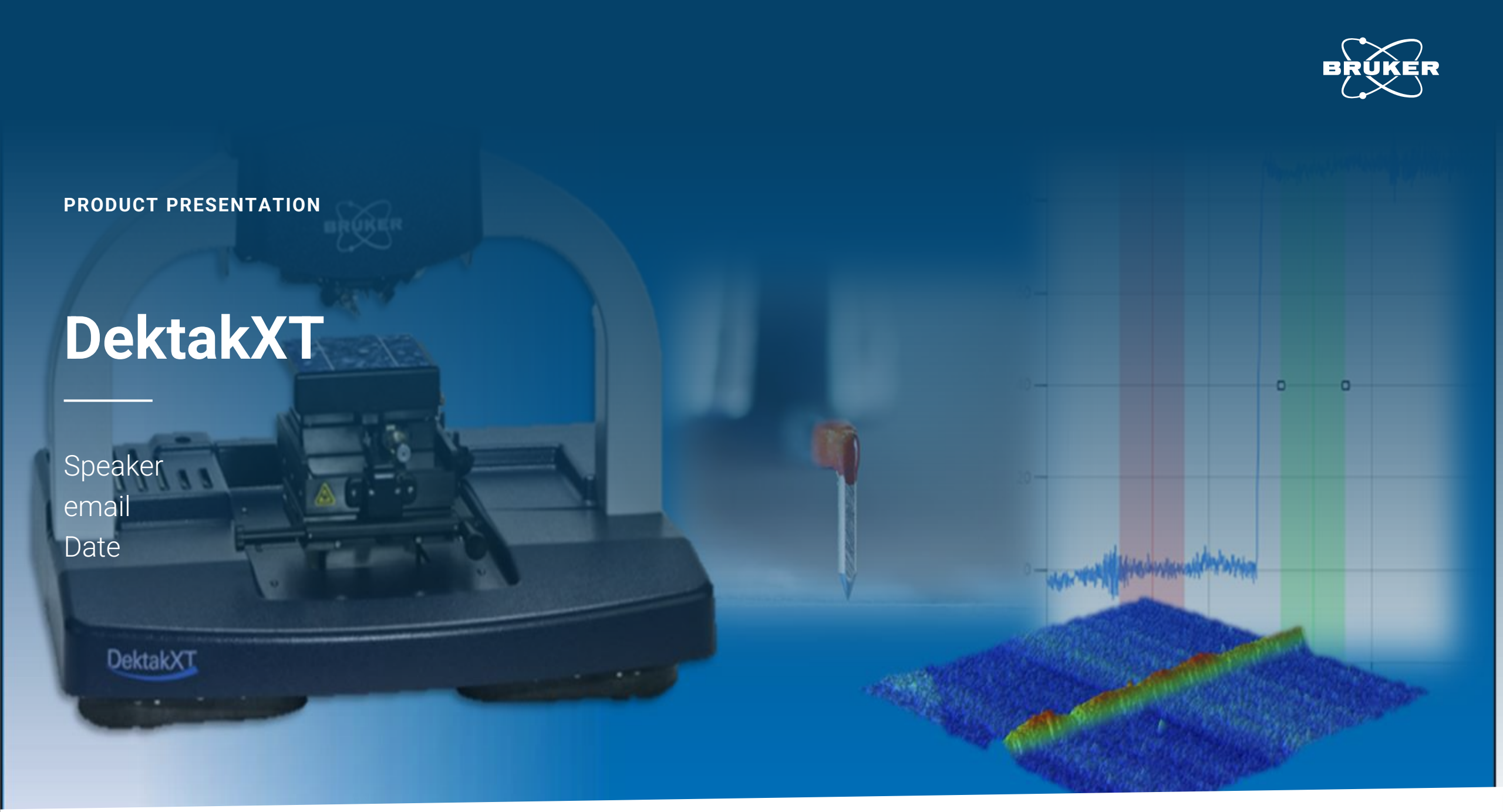
PRODUCT PRESENTATION

DektakXT

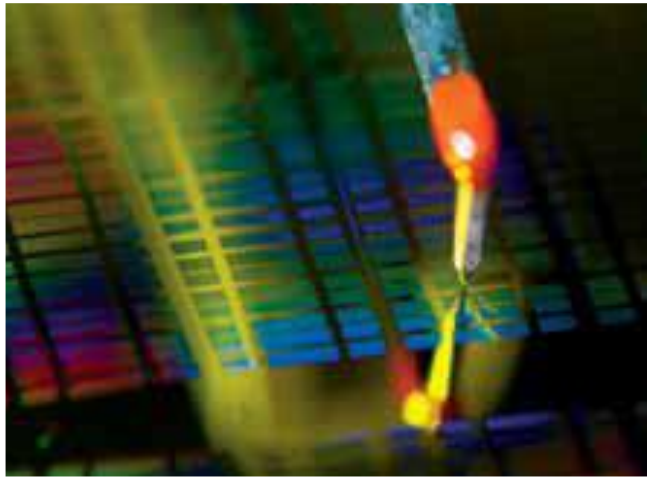
Speaker
email
Date

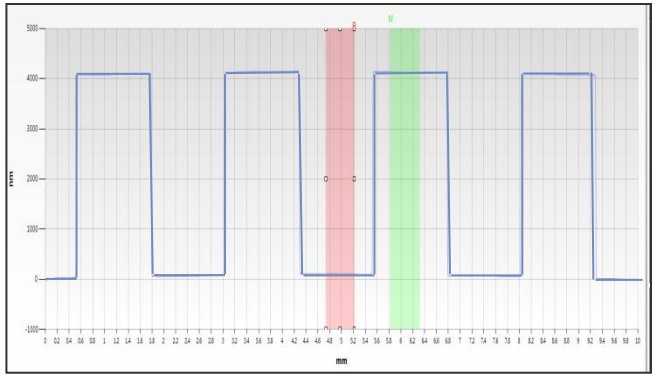


Advantages of Stylus Profilometry

To Monitor Thin Film Deposition:

- Excellent measurement repeatability
- Measure thin films below 50 Å (5 nm)
- Thin transparent films or dissimilar optical characteristics
- Long scan measurements up to 200mm to analyze thin film stress
- Ease of use (fast, simple, step heights)
- Lower cost, long life, durable and upgradeable





Dekak-XT Stylus Profiler

- Unmatched performance and better than 5 Å repeatability
- Unprecedented efficiency and ease of use
- Incomparable value from the world leader in stylus profilers

DektakXT Technological Advances

- Improved Resolution Through:
  - Lower noise floor achieved with new Single-Arch design for improved stability
  - Built-in vibration isolation
  - “Smart Electronics” establish new low-noise benchmark
  - New environmental enclosure design reduces affects of acoustic noise and air currents
  - Improved baseline stability by referencing all scans to thermally stable, glass optical flat, polished to Lambda-over-ten (λ/10)
- Enables step height repeatability of better than 5 Å !

DektakXT Configurations

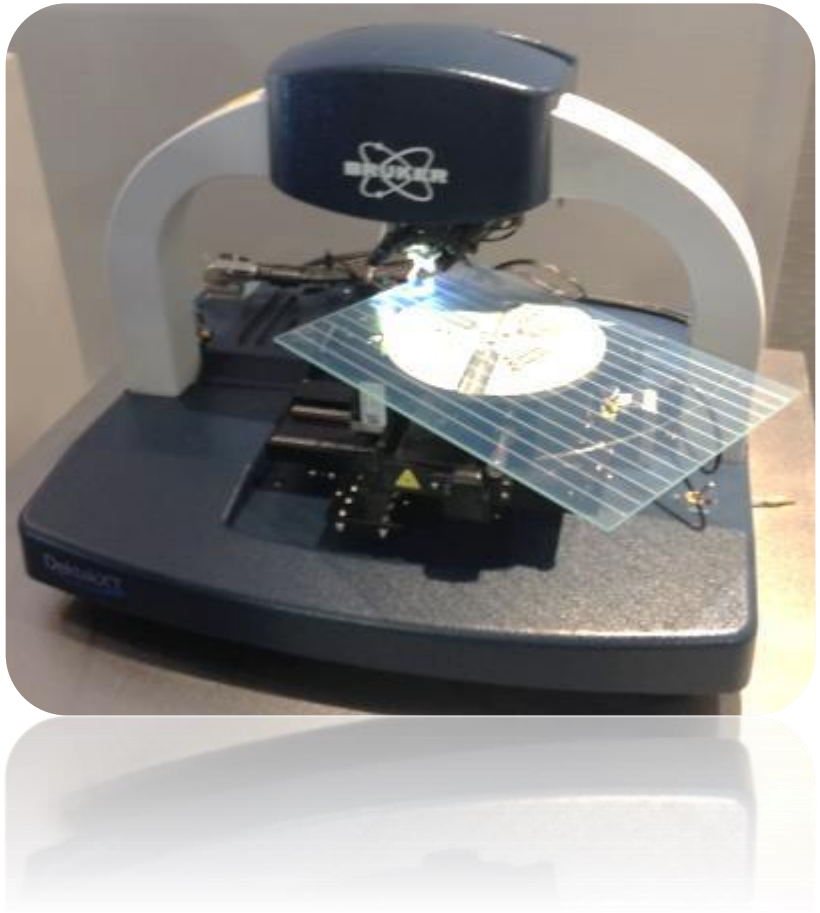
- Configurations to meet your application and budgetary requirements
- Upgradeable for future application needs
- Incomparable value from the world leader in stylus profilers

Manual XY Stage Configuration

Auto X-Y-Theta Stage with 8” wafer vacuum chuck

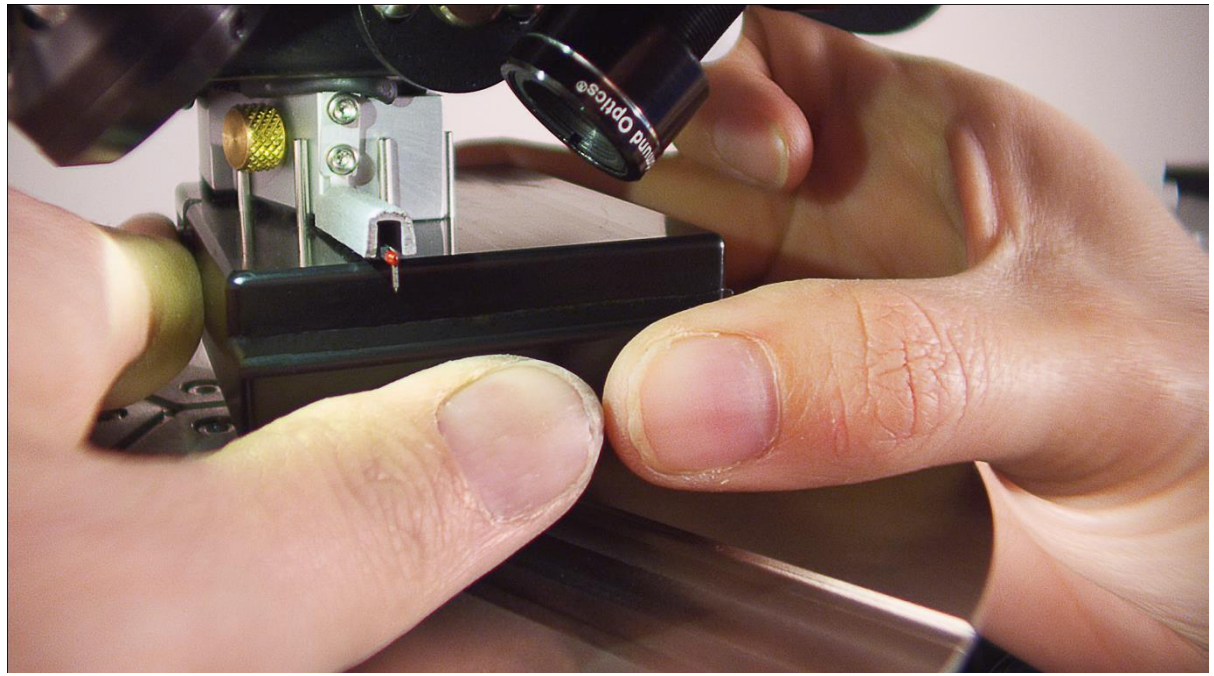
Sample space

- Bridge design accommodate large samples
  - Dektak-XT accommodates up to 8” wafer
  - Bridge design allows flexibility on sample positioning
  - Example of glass panel



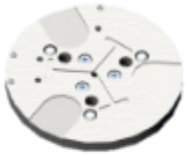
Effortless Tip Exchange

- Self-aligning styli and assembly enables tip exchange in less than a minute
- Removes concern of mistakes in multi-users facilities

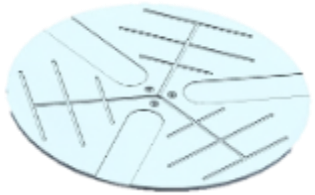


Dektak-XT Options

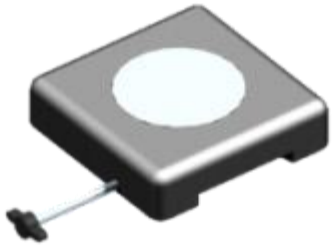
- Isolation Pads: Provide additional vibration resistance. 4-pads connect to central air line. Requires ~50psi air
- Laptop: Reduces foot-print and increases portability for limited space lab or clean room.
- Multiple Chuck Options: A variety of vacuum chucks available for 50mm to 200mm wafers, as well as ceramic vacuum chucks for small, flexible samples, and 6” square solar chuck



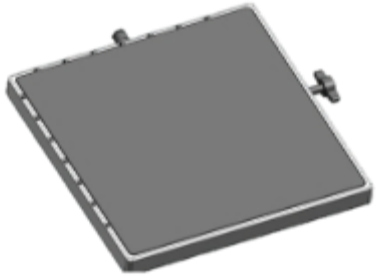
DXT-2-3IN WVC



DXT-8IN WVC



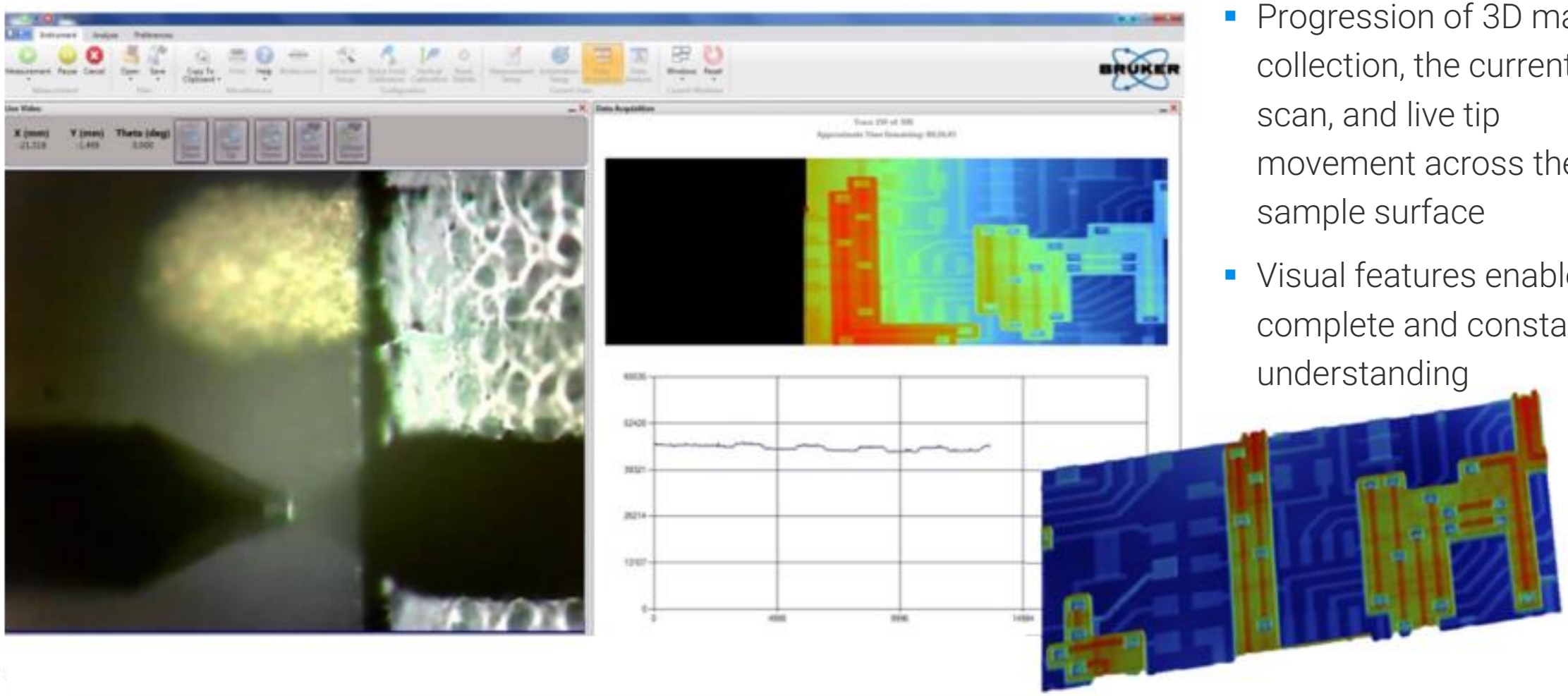
DXT-CVC



DXT-PV CHUCK

Black Stainless Steel Chuck (6inch)

Dektak-XT
Live 3D Mapping



- Progression of 3D map collection, the current line scan, and live tip movement across the sample surface
- Visual features enable a complete and constant understanding

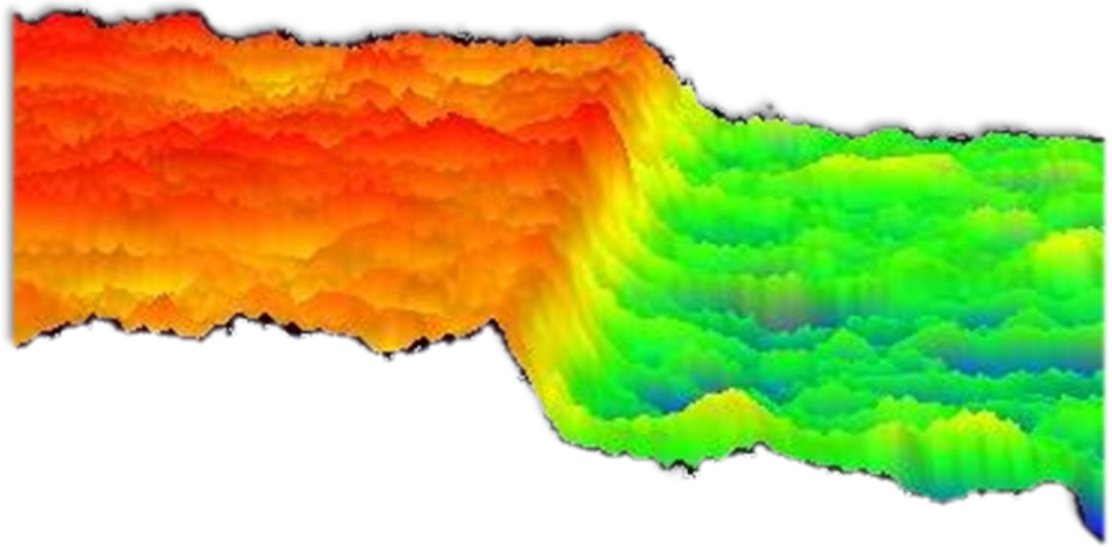
DEKTAK-XT

Vertical & lateral performances

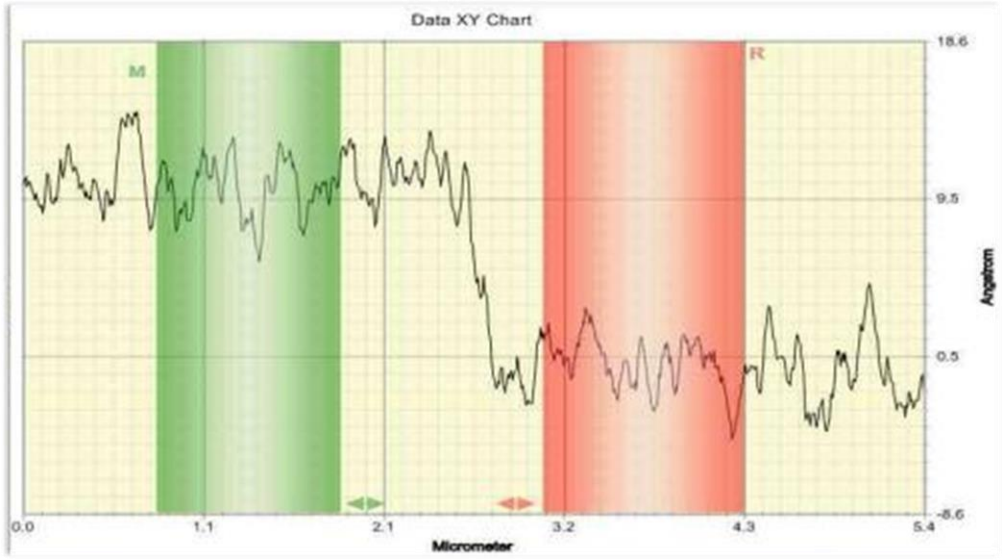
Ultimate vertical resolution
Design for stability

- Dektak-XT is the champion for vertical resolution by its rigid bridge design.

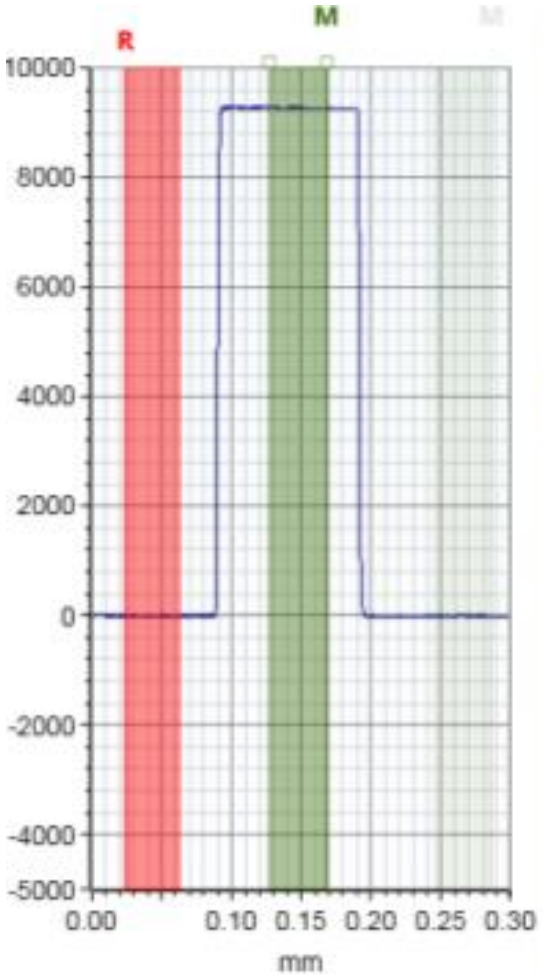
3D of 1 nm step



Profile on 1 nm step



Ultimate proven vertical repeatability
< 0.5 nm repeatability on 1 µm step



Analytical Results

Label	Value	R Pos	R Width	M Pos	M Width	ID
Total_ASH	9268.57 Å	24.46 µm	38.205 µm	0.168 mm	-41.18 µm	Segment 2

Meta Data

Label	Value
Date	11/4/2012
Profile	HillsAndValleys
ScanDuration	7 s
ScanLength	300 µm
ScanResolution	0.142721 µm
ScanType	Standard Scan
StylusForce	3 mg
StylusScanRange	6.5 µm
StylusType	Radius: 2 µm
Time	9:23:47 PM

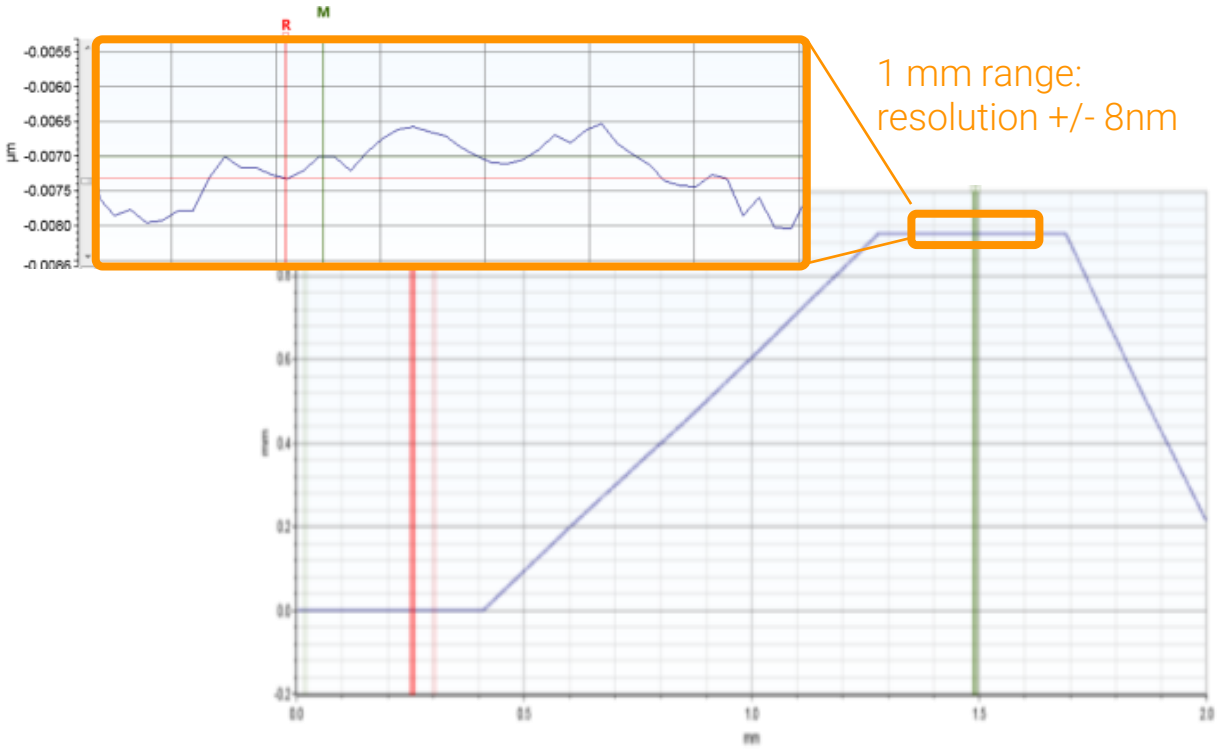
Fast scanning & low force

Database

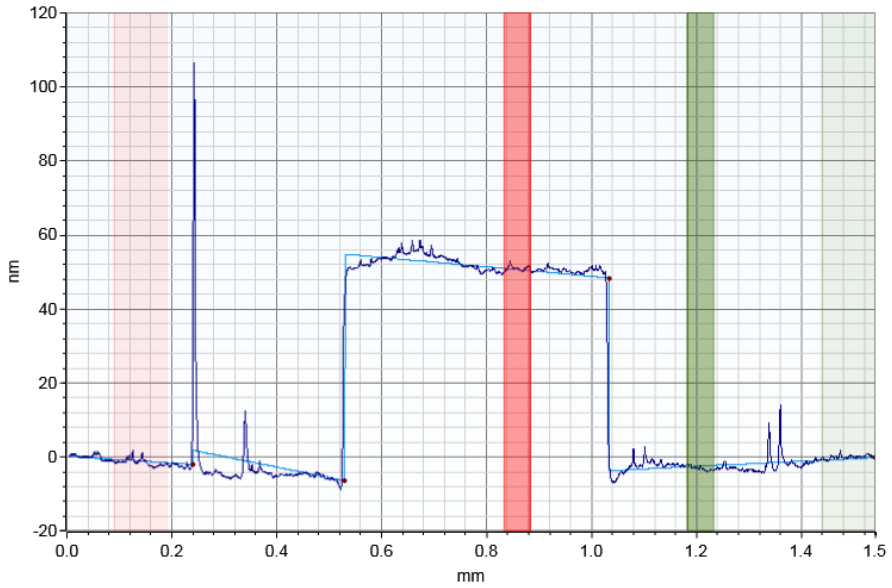
Measurement Number	Total_ASH Å R: 0.0244599 mm M: 0.168157 mm Always Always
13	9263.985
14	9268.909
15	9267.659
16	9270.775
17	9270.314
18	9267.495
19	9266.934
20	9255.471
21	9260.271
22	9264.278
23	9267.930
24	9270.673
25	9268.644
26	9256.782
27	9261.889
28	9257.183
29	9263.208
30	9265.689
31	9266.923
32	9268.573
Avg:	9266.586
Std:	4.458
Max:	9272.771
Min:	9255.471
Range:	17.301

From nanometer till millimeter Single head

- Cover wider range of application in seamless manner: click & measure!
- One single measurement head covers from 1 nm till 1 mm step height as well as load from 0.03 up to 15 mg



0.9 mm step @ 15 mg

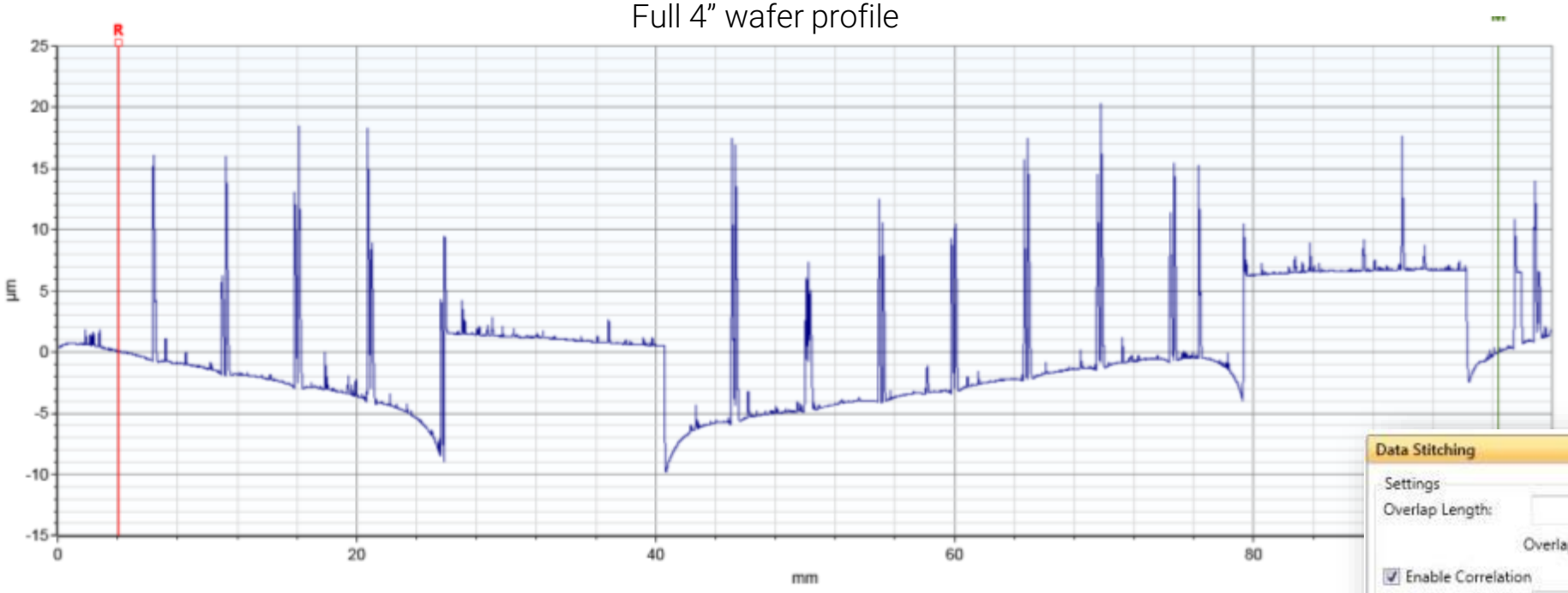


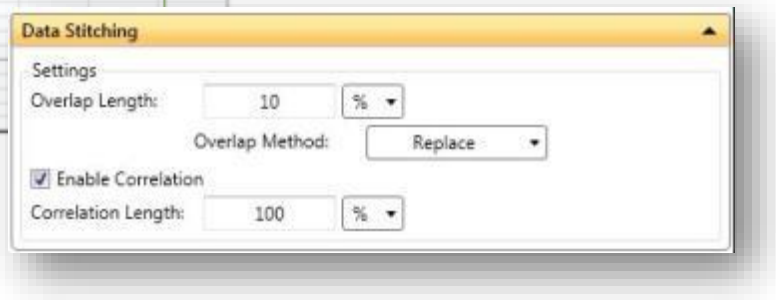
54 nm step @ 0.03 mg

160 mm scan length
Flatness and Stress up to 8” Wafer

- Advanced algorithm ensures slope & feature continuity to extend scan length up to 160 mm

Full 4” wafer profile





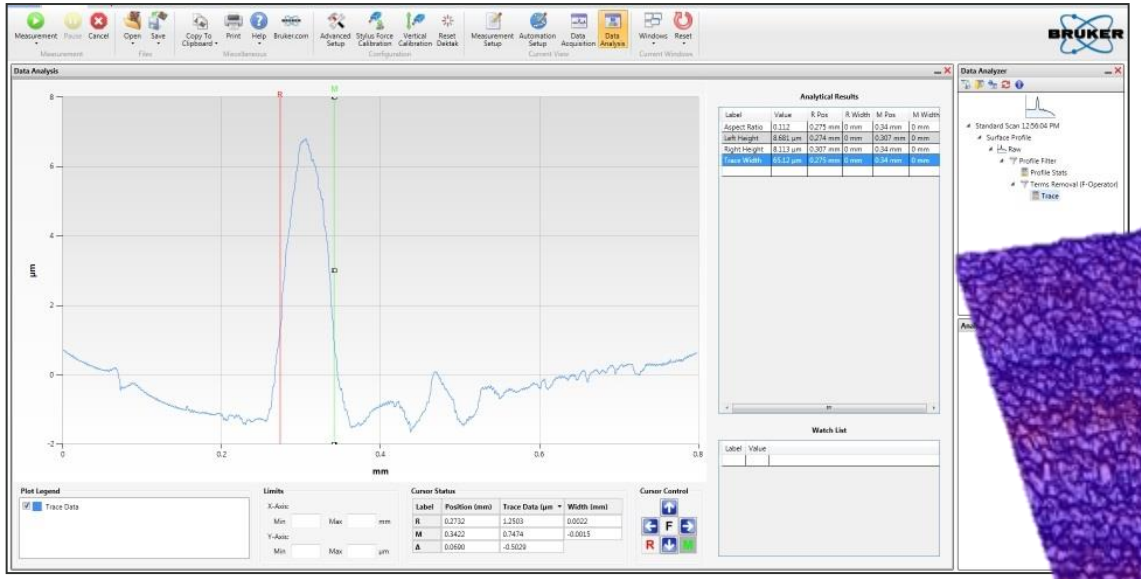
DEKTAK-XT

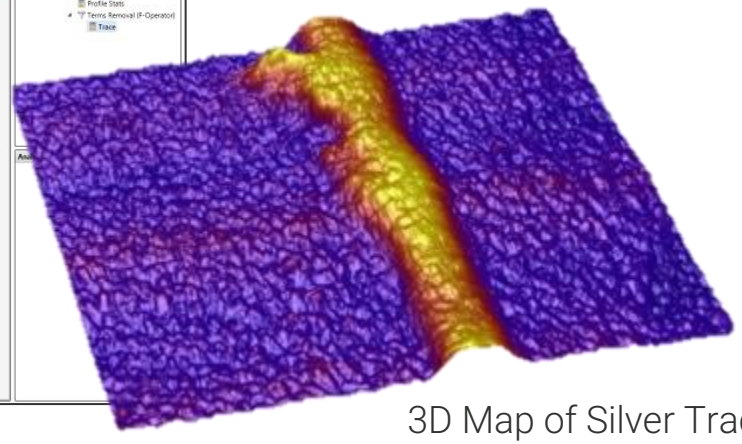
Applications

Photovoltaics

- Inspection of conductive streets
- Monitoring deposition process of thin film
- Laser scribing control and monitoring
- Thin film stress measurements

Mono & Poly Crystalline Cells



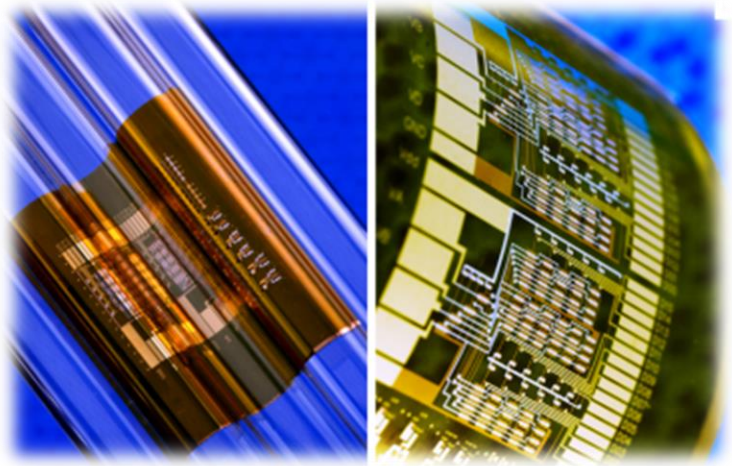


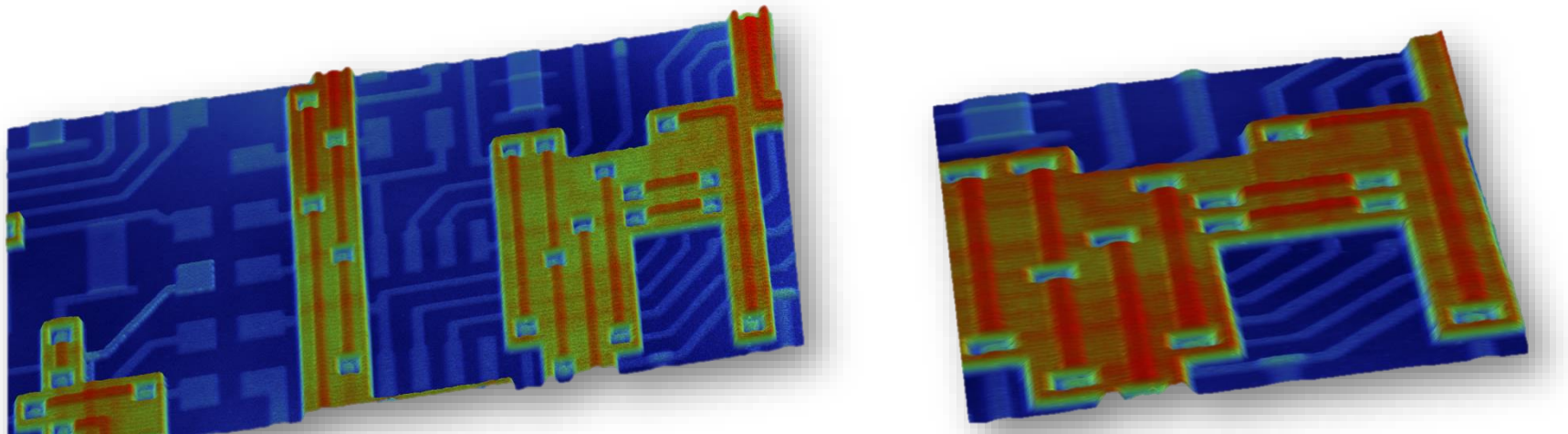
3D Map of Silver Trace

Flexible Solar Cell

Microelectronics Applications

- Monitoring deposition and etching processes
- Measuring trench depth dimensions
- Microelectronics extend into aerospace, medical, automotive
  - Sensors in demanding environments
  - Rigid ceramics to flexible circuits

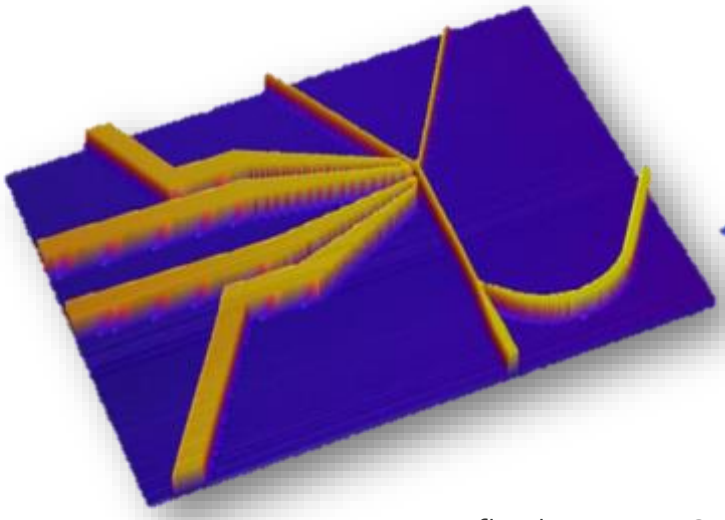


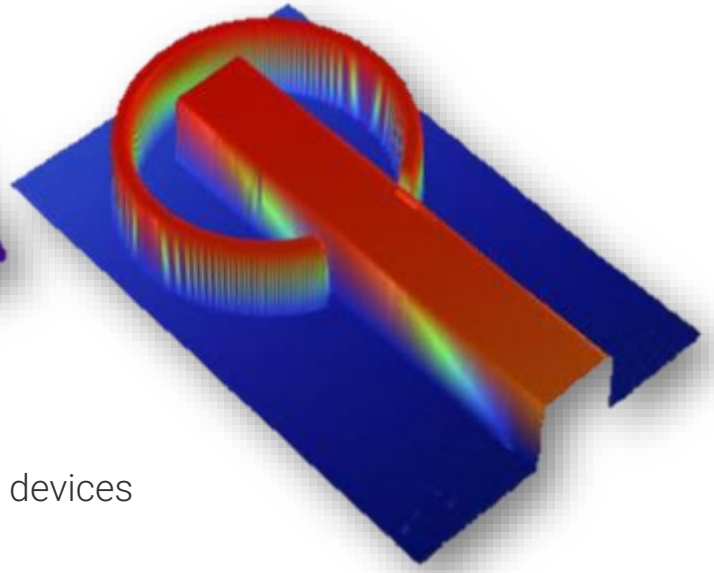


Microelectronics and thin film step heights

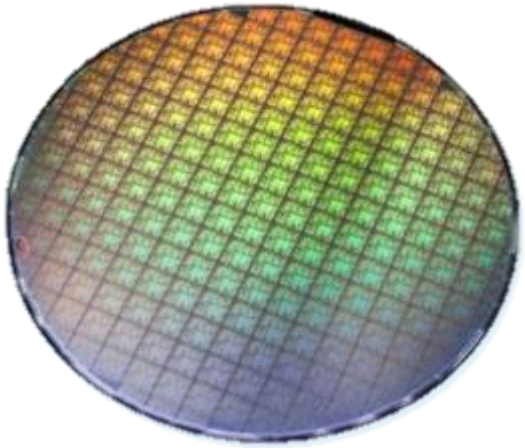
MEMS Applications

- Measure large vertical features of sensitive materials (up to 1 mm tall)
- Low force measurement capability applies a light touch on sensitive materials to measure vertical steps and roughness without damaging the sample's surface



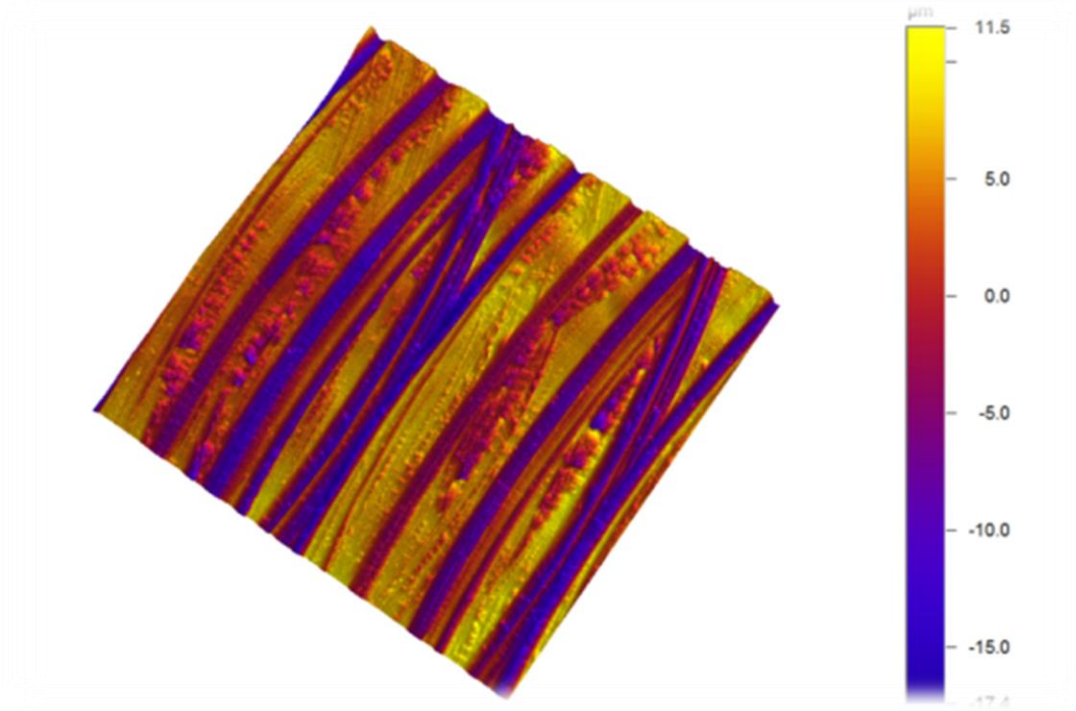


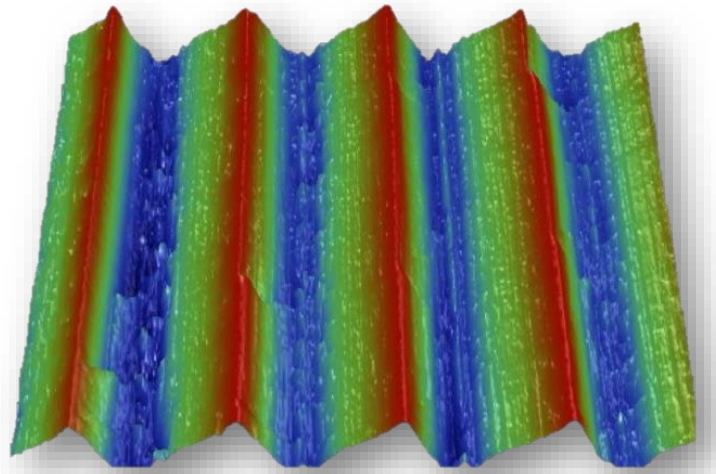
Microfluidics MEMS devices



Machined Surfaces Applications

- Medical application: Verification of hydroxyapatite growth on implant backside
- Inspection of polished surfaces





Thin Film Applications

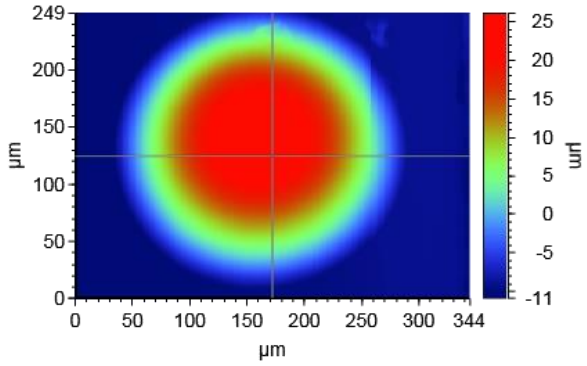
- Microelectronics and Semiconductor devices
- Thin film coatings on glass for buildings, automobiles or aircraft
- UV or hardness coatings on eye glasses or sun glasses
- Decorative coatings on faucets and fixtures (gold plating or other precious metals)
- Paint coatings and ink thickness and finishes
- Pressure sensors for automotive or aerospace applications

Microlenses Applications

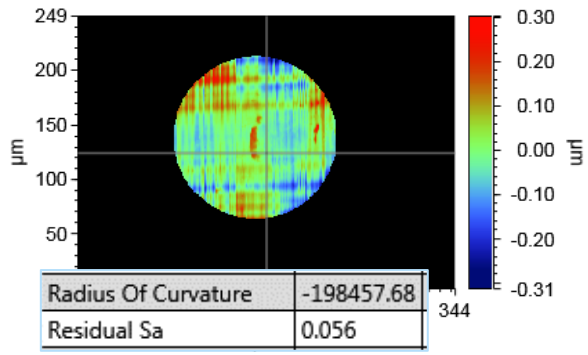
- Advanced Zernike analysis allows automatic location of lens and automatic fit with 8 order polynomial. Roughness represents deviation versus this fit. Zernike coefficients fully characterize optical behavior of the microlens

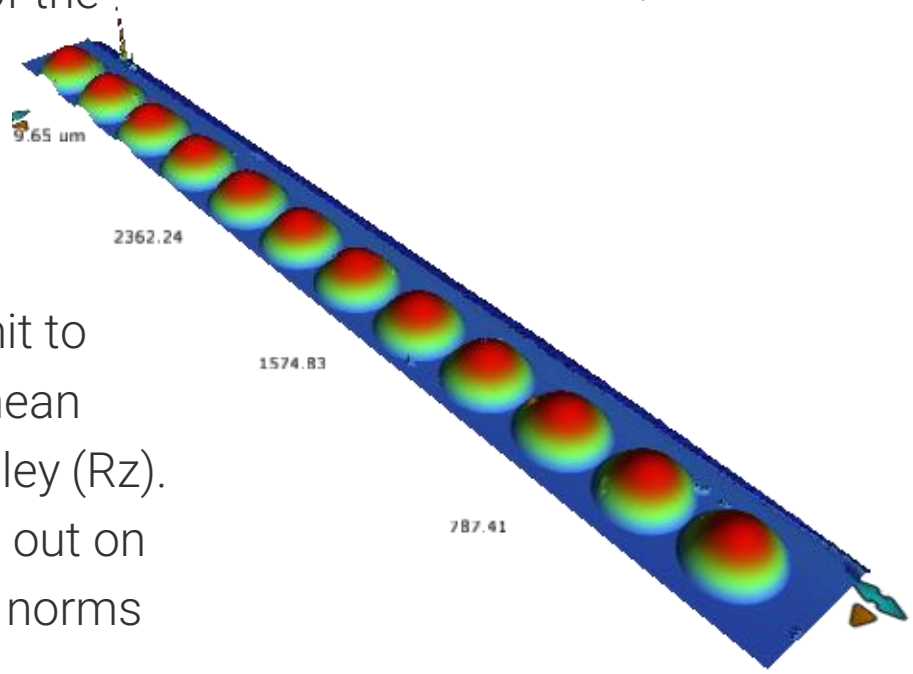
- Section analysis through the summit to extract mean curvature (Pcurve), mean roughness (Ra) and mean Peak Valley (Rz). Roughness parameters are worked out on filtered trace according to ISO filter norms

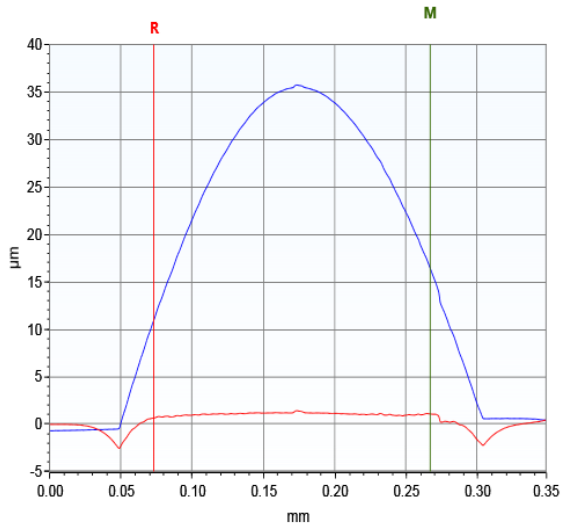
Raw 3D view



Roughness after shape-removal



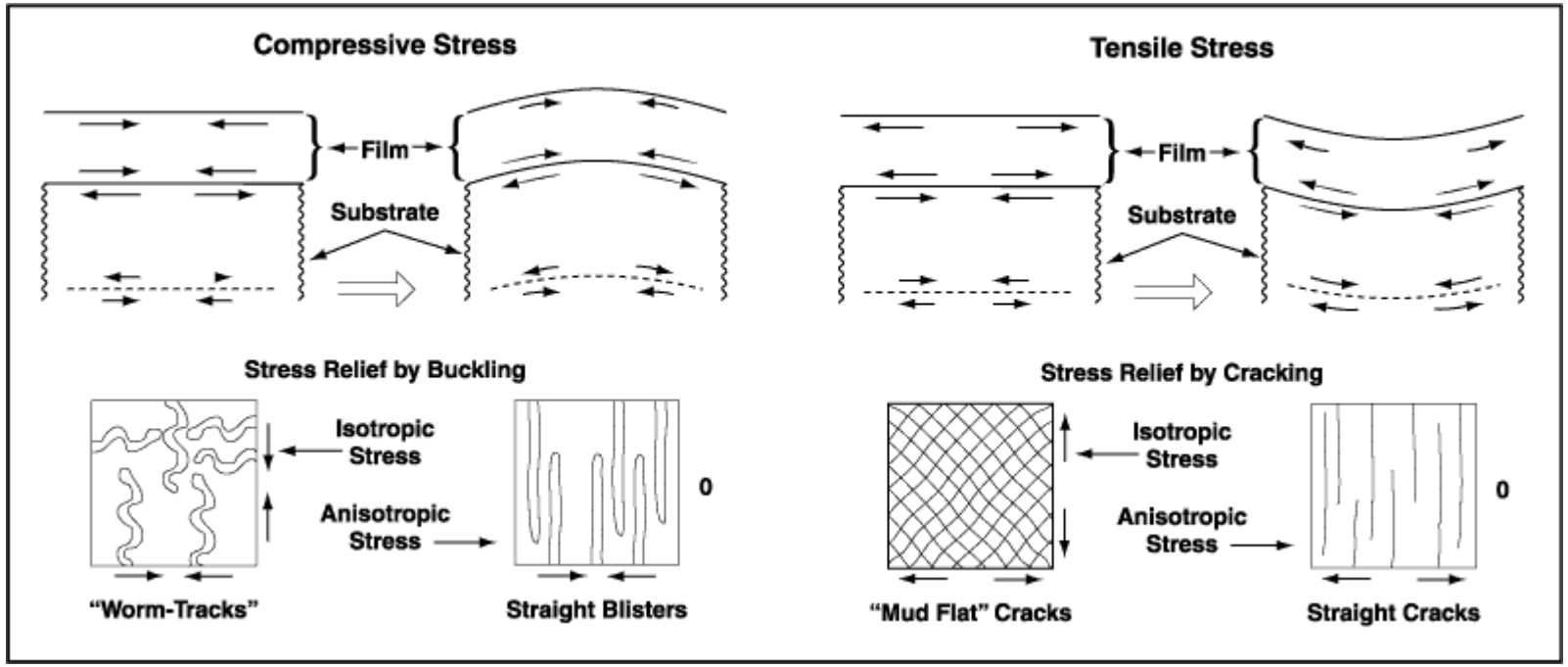




Label	Value	Units
PCurve	-0.211	mm
Ra	0.104	µm
Rz	0.787	µm

Film Stress Applications

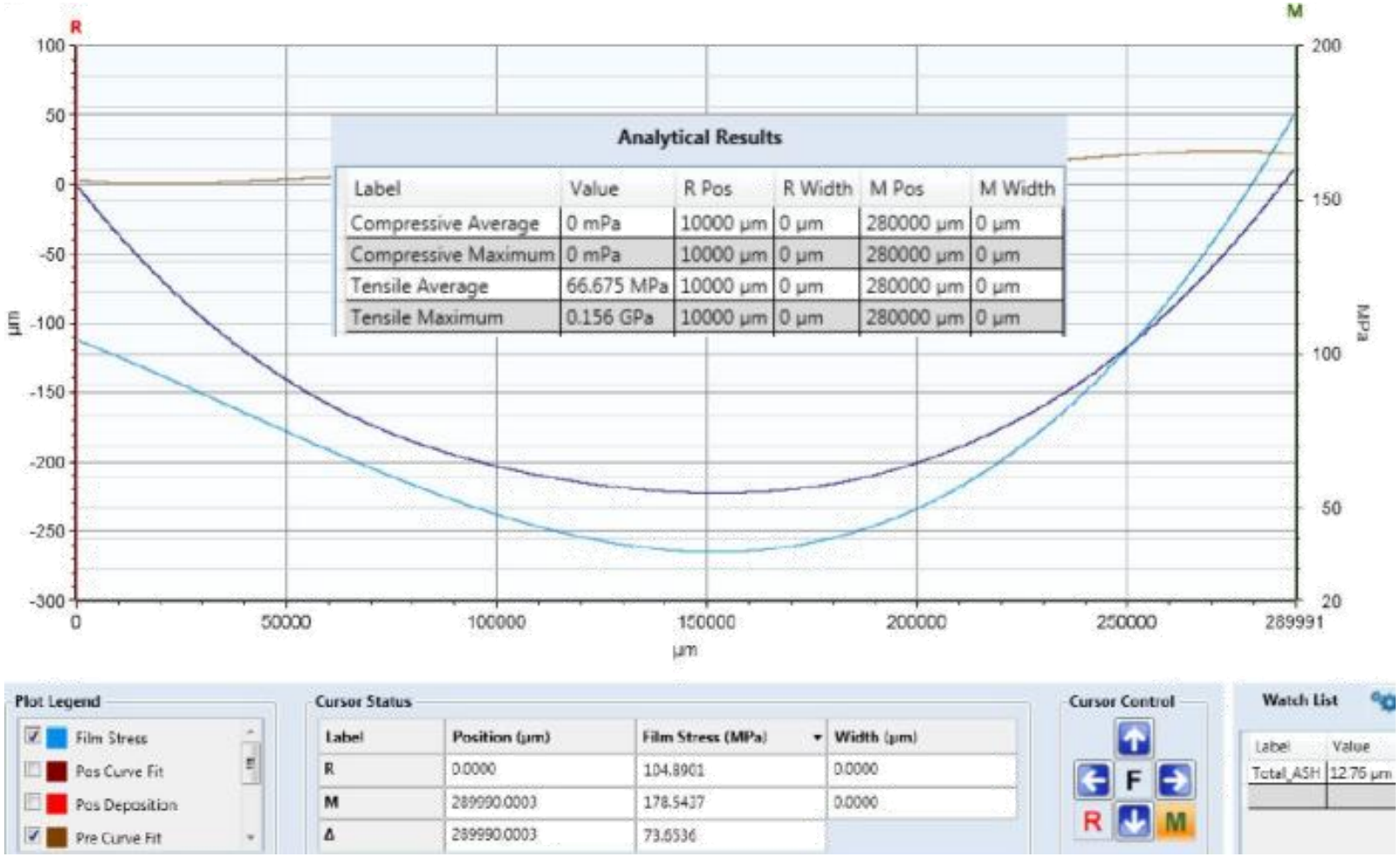
- Stress causes bowing or warping of substrate leading to de-lamination of layers, cracking or lithography problems
- Less stress is therefore USUALLY desirable.
- Engineers' goal is to minimize stress. But to minimize it, you need to know it!



Film Stress Applications – 2D Example

- Example: 2D stress anlaysis on Ni coated 300 mm Si wafer

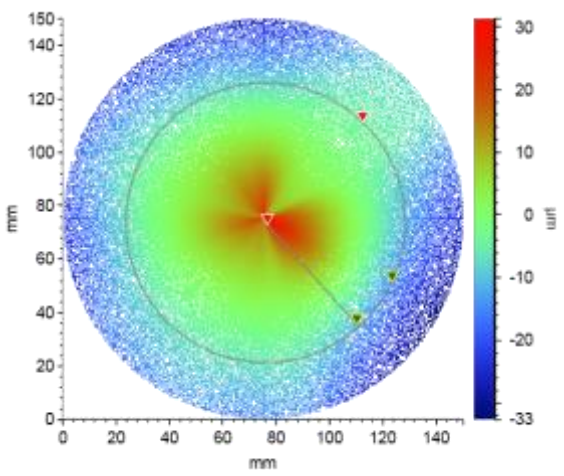
- Stitching enables longer trace so stress measurement on larger wafers is possible. Example shown here arises from Dektak-XTL which has 300mm stage. Dektak-XT only reaches 8” trace capability.



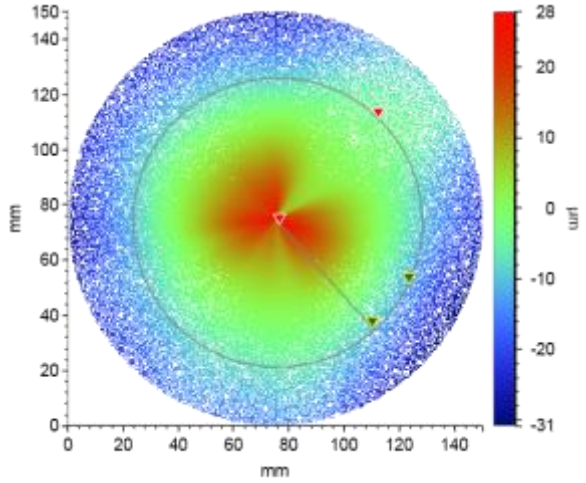
Film Stress Applications – 3D Example

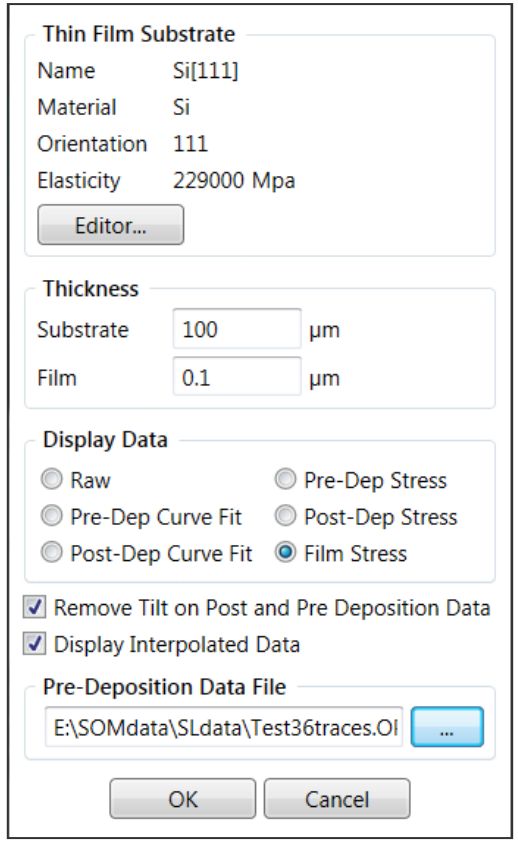
- 3D Stress on 8” wafer (on DektakXT-A using radial mapping)

Before deposition

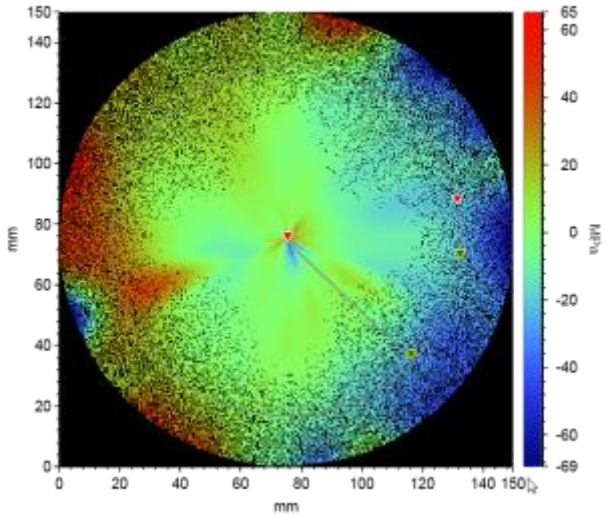


After deposition



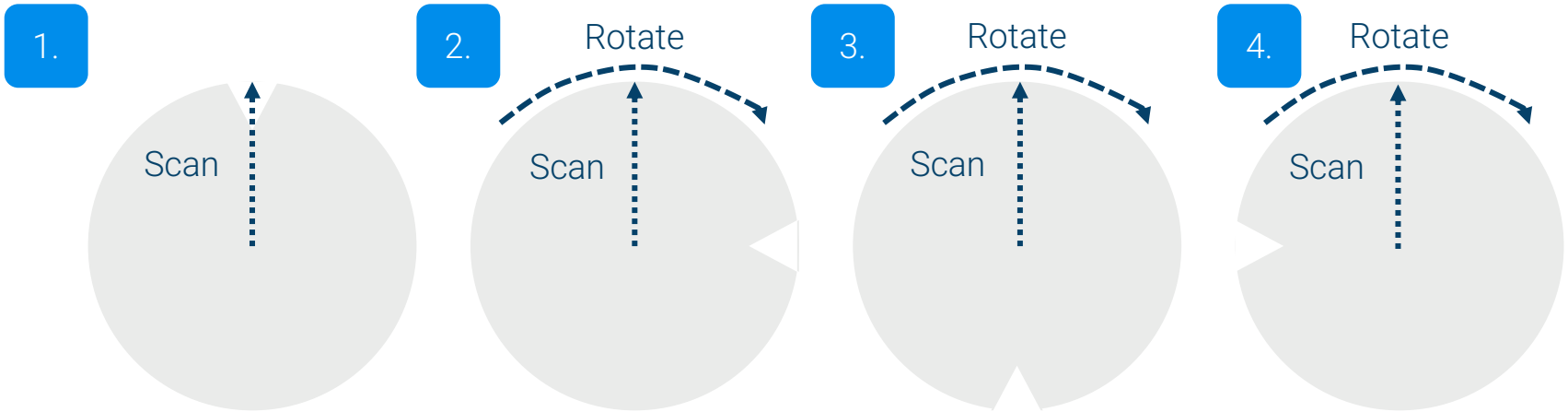


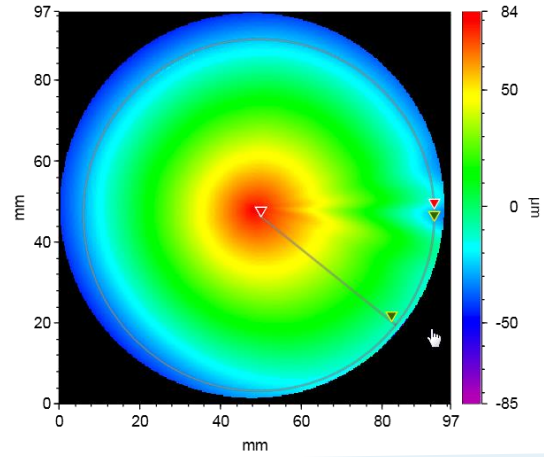
Stress map result



3D Radial Mapping

- Allows one to cover up to 8” wafers on a DektakXT-A
  - 360° Roll-off
  - 3D Stress
  - Full 3D shape
- Sample courtesy from XUV, Twente U.





3D Radial Mapping

- Repeatability test on radius of curvature: The 4” wafer shown in previous slide was measured 10x times with automatic extraction of average sphere radius from full 3D image

- Results:
  - ROC: 1 sigma = 10 mm (known within 0.1%)
  - Flatness (Rz): 1 sigma = 1 µm (known within 1%)

TimeStamp	Name	Radius of Curvature (mm)	Rz (µm)
16:32:02	Repeat1	-11736	125.5
17:01:34	Repeat2	-11719	126.5
17:01:34	Repeat2	-11719	126.5
17:31:05	Repeat3	-11718	127.2
17:31:05	Repeat3	-11718	127.2
18:00:37	Repeat4	-11707	128.0
18:00:37	Repeat4	-11707	128.0
18:30:08	Repeat5	-11706	128.7
18:30:08	Repeat5	-11706	128.7
18:59:40	Repeat6	-11704	129.6

Value	Radius of Curvature (mm)	Rz (µm)
Average	-11714	128
1 sigma Std	10	1.2
% variation	-0.09%	0.95%

DEKTAK-XT

Flexible Analysis

Simplified Analysis interface Efficiency & Statistics

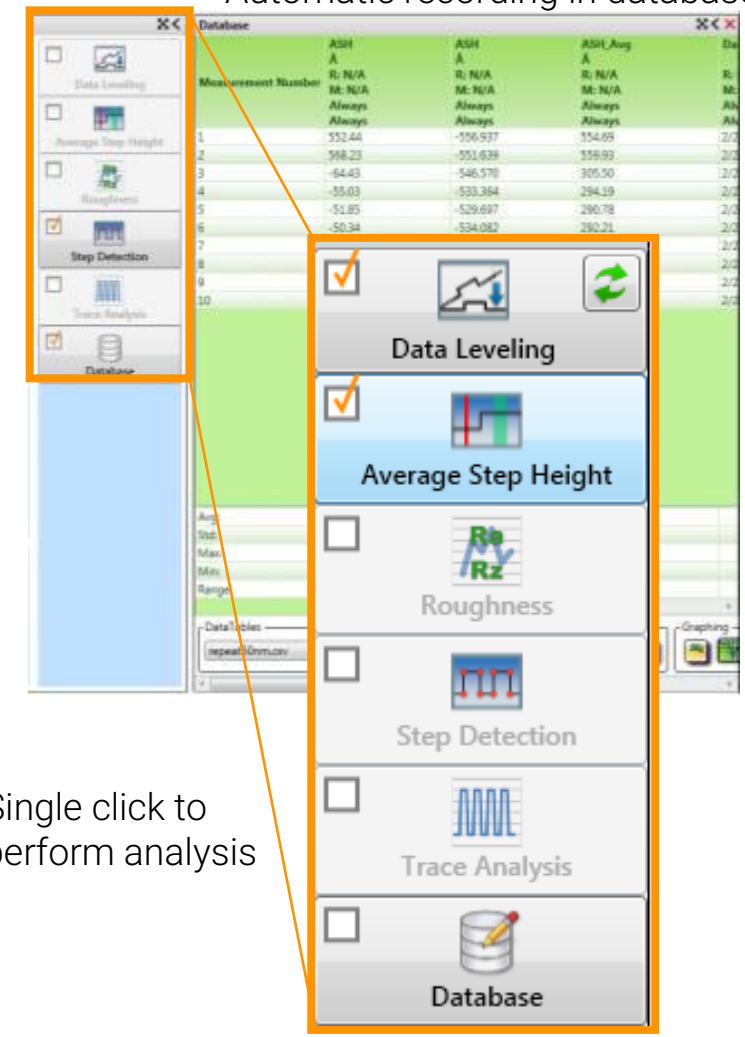
- All key analysis are present in clear & graphical interface

- Leveling includes:
  - 2 points
  - Polynomial order up to 4th order
  - Exclusion of region & by histogram

- Step & Trace analysis allows automatic calculation of step height, spacing, width

- Once analysis is selected, check on database directly creates all columns with analysis results & experimental parameters

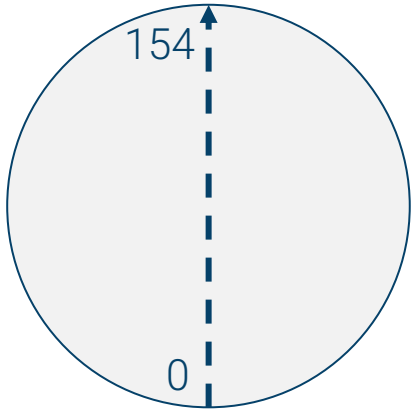
Automatic recording in database



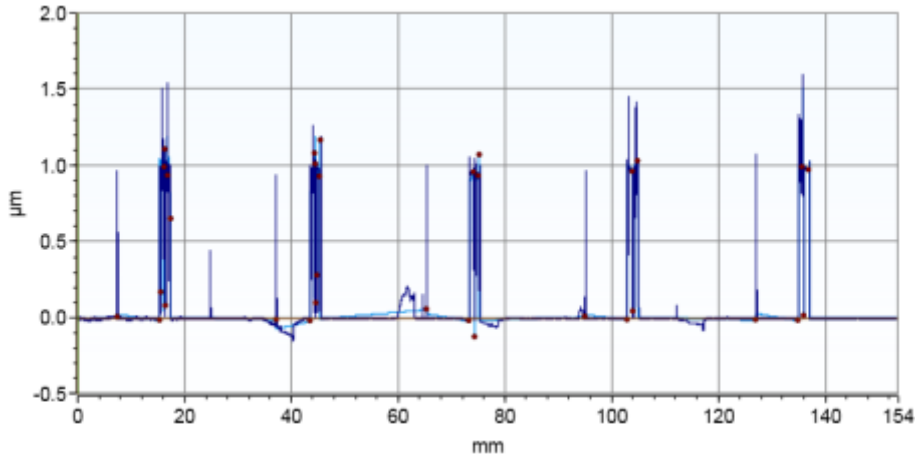
Single click to perform analysis

Advanced interface
Multiple analysis capability

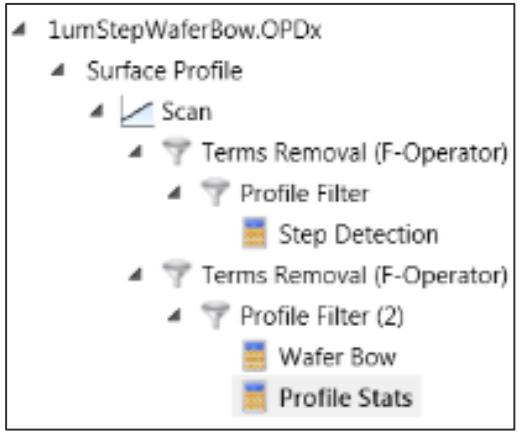
- 1 single trace: 154 mm
  - 3 stitched traces
  - 2 combined analysis
  - ALL results



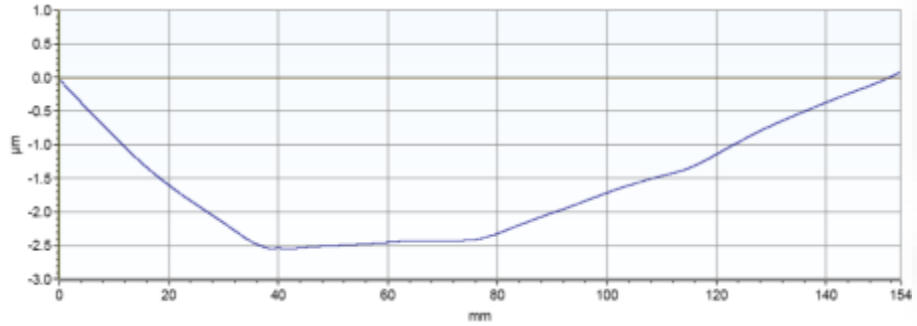
Step analysis



Analysis tree



Wafer shape analysis



Analytical Results

Label	Value	Units
Pt (Fitted)	2.661	µm
Pt (Raw)	2.627	µm

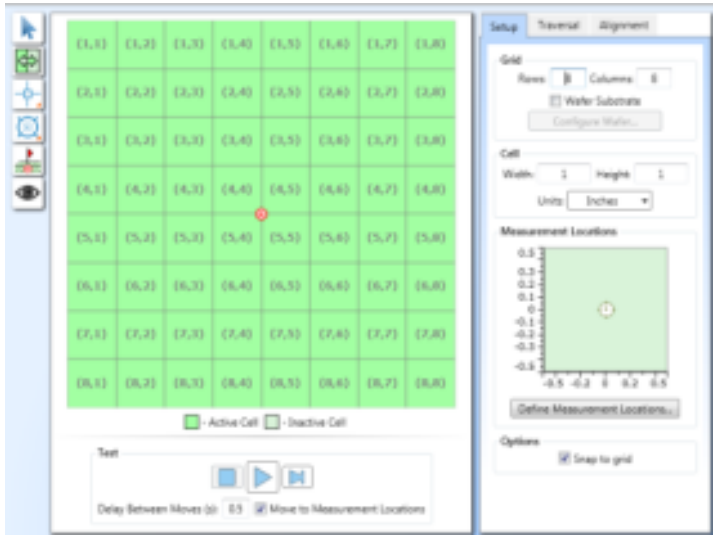
Label	Value
Total_Radius	1013163.2 mm

DEKTAK-XT

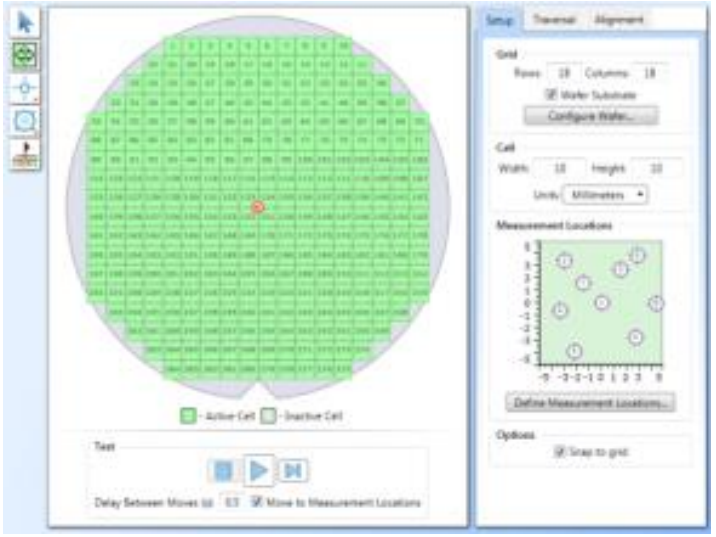
Automation

Automation programming
Full suite

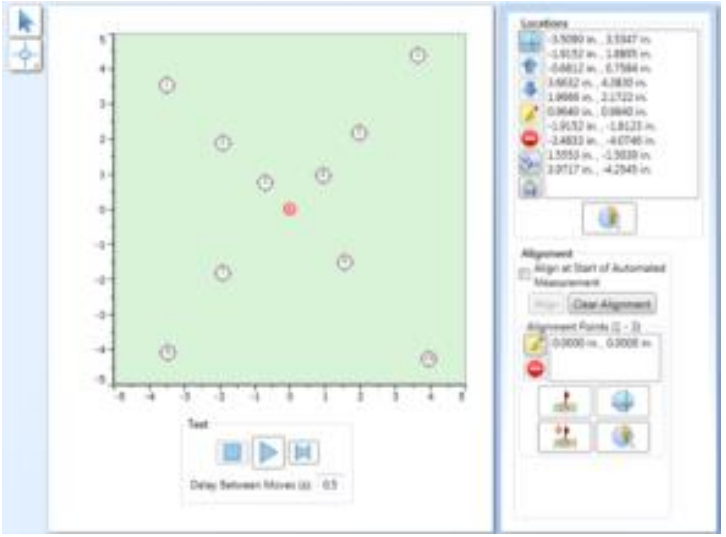
- Extremely simply GUI for the operator
- All included par default!



Rectangular grid
Application: defect review



Wafer Type (2”, 4”, 6”, 8”, 12”)
Application: multi-sites on different dies



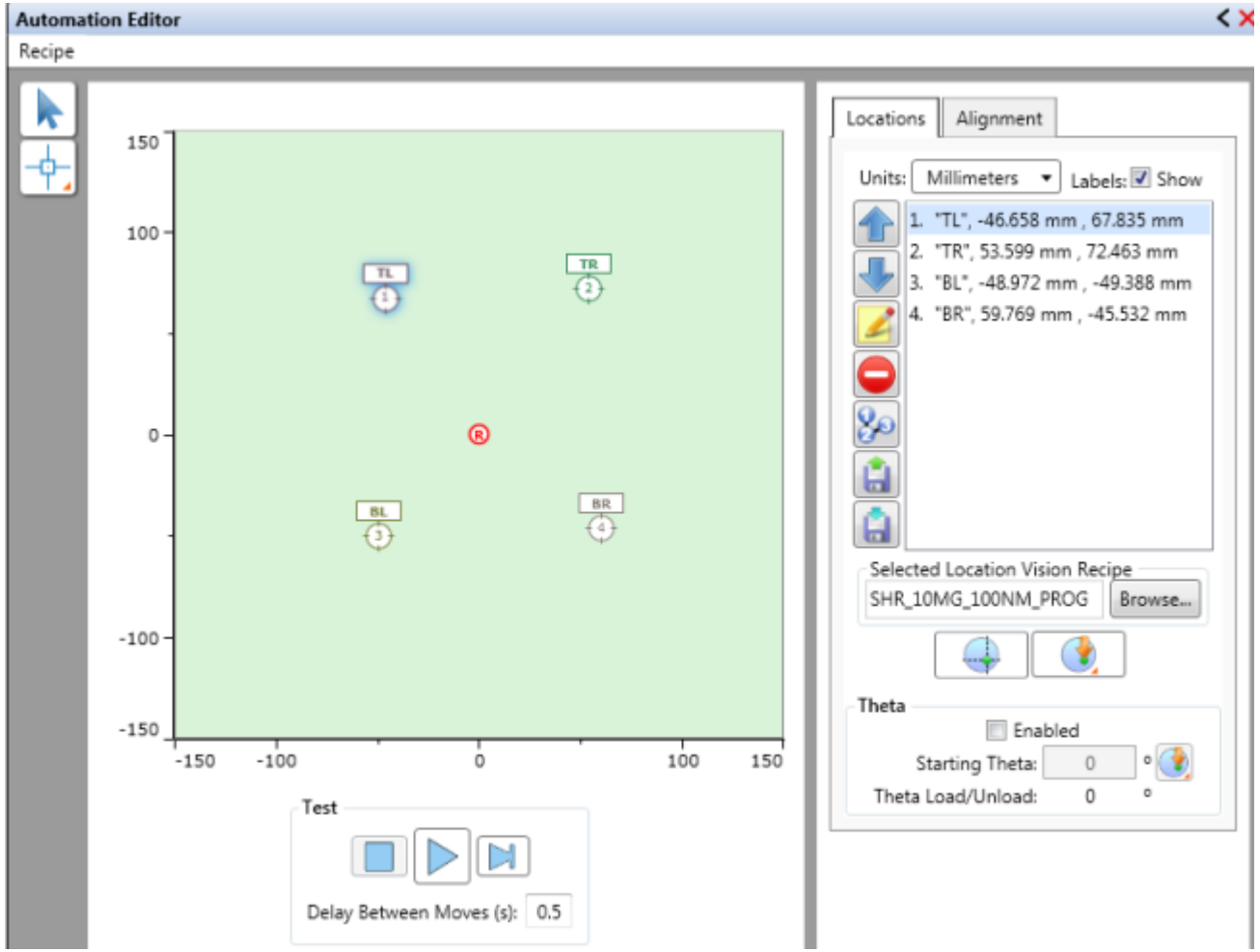
User Defined Random Location
Application: complex surface

Automation programming
Many features for QA/QC

- Site Naming
- Log site name to database
- Link unique Vision recipes to sites
- Program Load/Unload theta Positions

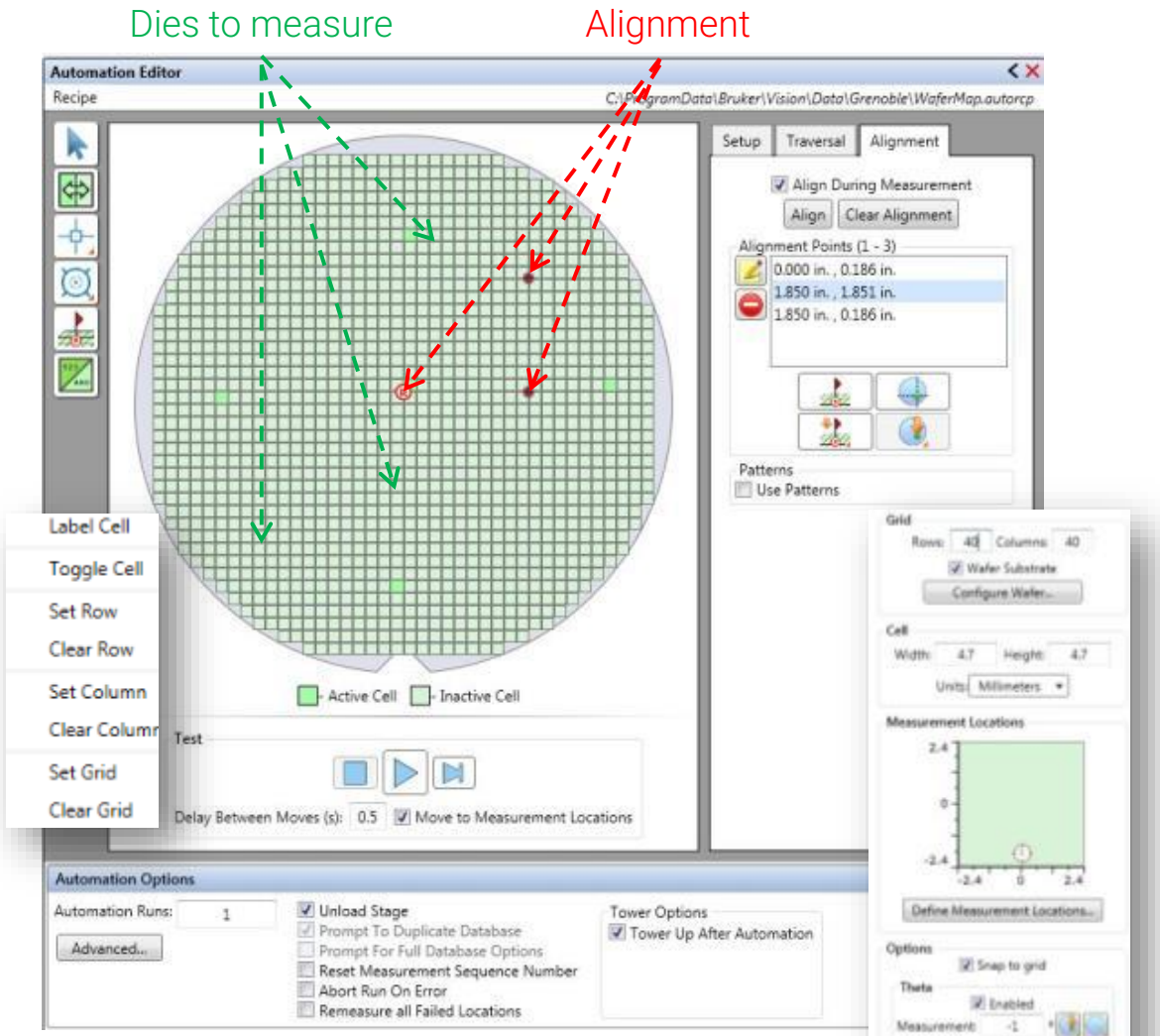
- Fool-Proof Automation Setup

- Prompt Vision to run a user defined executable after automation

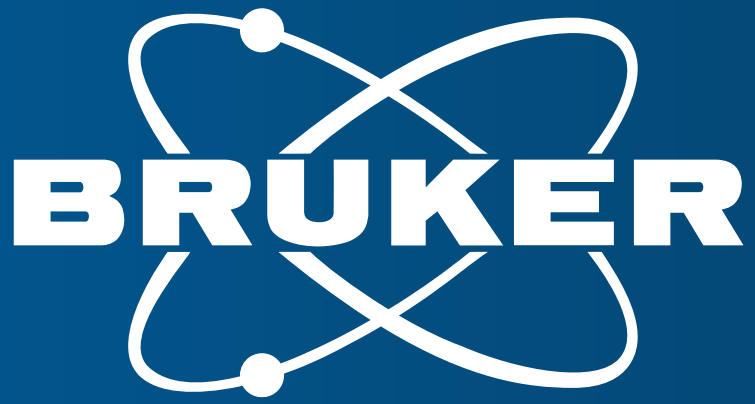


Real-time setup of automation
Full 8” wafer map

- Direct selection of wafer type and notch orientation
- Automatic population of dies after input of XY die size
- User graphically selects positions for fiducials
- User graphically selects dies to measure (plain green)
- User select position inside one die: all other dies are automatically populated
- Once aligned on fiducials, user can freely navigate all through the wafer
- Once automation is done, system automatically unload sample and place stylus in safe position



Measurement location



Innovation with Integrity