Contour 3D Optical Microscopes
What’s New in Vision64?

Atomic Force Microscopy
3D Optical Microscopy
Tribology
Automated AFM
Stylus Profilometry
Mechanical Testing, Nano Indentation

Innovation with Integrity
• **Introduction**
  - *Bruker Nano Surfaces*
  - *Bruker Stylus and Optical Metrology (SOM)*
  - *3D Microscopes intro*

• Vision64 – What is it? What’s new with it?
  - The “engine” for Bruker 3D Optical Microscopes
  - New and powerful features – automation, imaging, ease of use

• **Summary**
Bruker Nano Surfaces Division

Introduction

- Scanning Probe Microscopy
- 3D Optical Microscopy
- Stylus Profilometry
- Tribology and Mechanical Testing
• History of R&D, QA/QC and production surface metrology
  • University and Research Labs
    100’s Installed base
  • Electronics and Industrial
    1000+ Installed base
  • Worldwide
    10,000+ Installed base

• Manufacturing Excellence
  • Lean, six sigma-based process
  • 100+ systems/quarter capacity
  • Rapid production ramp capability
Speaker
Brief Introduction

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Bruker Corporation
Nano Surfaces Division
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- Applications Development Engineering Manager at Bruker SOM (2.5 years)

- Industry experience (17 years) optical engineering, fabrication and metrology

- Earned Ph.D. – during work with private metrology equipment manufacturer
ContourGT 3D Optical Microscopes
Flexible, Accurate and FAST!

Production Ready - ContourGT-X

Bench-top Industrial ContourGT-I

ContourGT-K – Best Value Metrology
3D Optical Microscopes
What is a “3D” microscope, anyway??

- Microscope with special objectives, scanned perpendicular to sample – reflected signal processed to produce accurate height map

Coherent light interference builds height map
Outline

Presentation Overview

- Introduction
  - Bruker Nano Surfaces
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- **Vision64 – What is it? What’s new with it?**
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- Summary
Demonstrating and Delivering Value
Vision64 and Bruker 3D Microscopes

Capital metrology equipment is an investment of…

Money
Purchases of Equipment

Time
Tool Training and Learning

Productivity
Value from metrology

Vision64 is the heart of Bruker’s surface metrology solutions…

- Streamlines product use
- Saves operator time
- Improves bottom line
Several new features and capabilities for flexibility include...

- Automated VXI universal imaging
- Color CCD imaging, 3Di color overlay, other data display tools
- Cylindrical stitching and cylinder automation
- Auto-save data/Auto-run .EXE files for post automation flexibility
- Flexible automation setup
- Integrated support for NanoLens AFM “1000x” imaging from Vision64
New *Universal* Measurement Mode
VXI on Bruker 3D Microscopes

- **Vision64 brings flexible scanning options**
  - VSI (large area, long scan) – speed
  - PSI (smooth) high speed, high quality
  - And now, **VXI – Universal** mode, for any stepped, smooth or rough surface!

- **VXI uses complete optical signal for optimum universal result**

- **VXI renders topography by...**
  - *Self-sensing* smooth/rough surface
  - *Producing* highest quality data on smooth surfaces
  - *Reducing* noise and artifacts on rougher surfaces

Ra ~ 20 nm
Monochrome CCD
Standard option
False color palette

Typically used on a variety of 3D microscope systems
Color CCD Flexible Implementation

Default and Auto White Balance – Easy!
Vision64 Enables Color CCD
Highest Accuracy + Enhanced Images

- **True color** contour image, lighting/intensity display with **interferometric** imaging objectives

- **3Di interactive display** - graphical slider over palette (from “false” to true-color overlay)

- **2D traces** overlay on **3Di color** display showing most accurate height data

- **Provides same vertical resolution/accuracy with tremendously improved visual imaging**
Vision64 5.41 Data Display Features

Multiple Plot Views

- **Control+Click** – *Insert/remove plots into/from view*

**Powerful way to show multiple analyses**
Vision64 5.41 Data Display Features
Critical Dimensioning Tool
Flexible Dimensioning of Part Geometries
Vision64 5.41 Data Display Features
Analysis and Plot Results

Simplified Image Capture Options
Cylinder Stitching and Phi Automation
Added Flexibility to Variety of Applications

Flexible $\Phi$ automation and cylinder stitching supported!
Support of user analyses for applications specific examples – more on this later
Automation Functionality
Intuitive, Powerful Capabilities

Multiple methods for setting up automation
Simple, easy to use GUI setup

- **XY Scatter**
  - For measurement locations randomly placed around the stage

- **XY Grid**
  - For measurements where the locations are in perfect rows and columns. Multiple measurements can be made at each location.

- **Multi Grid**
  - For similar measurements that are repeated at multiple locations around the stage. Each location can have its own alignment points.
Flexible, Powerful Automation
Multi-grid Capability

- **Multi-grid automation**
  - Supports multiple measurements per die or region (trays, etc.)
  - Simple setup, fast!
Automation Functionality
Intuitive, Powerful Capabilities

Example Video Showing Multi-Grid Setup
Automation Functionality
Intuitive, Powerful Capabilities

Cognex patterns - example
Automation Functionality
Intuitive, Powerful Capabilities

Example Video Showing Multi-Grid Operation
Example Application
Utilize Key New Features of Vision64

3D Microscope Application – Compute intermetallic compound (IMC) formation in Cu wire bonding for bond quality control

- **True color** image, lighting/intensity display with interferometric imaging objectives
- **Automation** – Multi-grid automation
- **External Executable** operates on color image data
Application Example
Combined use of Vision64 functions

- **Step 1: Run multi-grid automation**
  - Measure multiple bond pad samples in a tray of parts

- **Step 2: Auto save .JPEG**
  - Auto save images for each site

- **Step 3: Auto run executable**
  - Post multiple grid completion – auto run 3rd party/homegrown software)
  - Return area of IMC *seamlessly* to Vision64
Application Example
Simple Database Set Up

Results logged to .csv file for easy further processing
Contour 3D Microscope + SPM
Vision64 support for NanoLens AFM

• **Applications include...**
  
  • Integrated 1000x highest resolution measurements
  
  • Small structure metrology (semi wafer apps, MEMS, lithography, etc.)
  
  • **Defect/Contamination Review**

Maximum “1000x” resolution with NanoLens AFM!
Contour 3D Microscope + SPM
Vision64 support for NanoLens AFM

- Integrated optics of NanoLens AFM allow complete sample view in Vision64
- Approach, withdraw, measurement operations initiated from Vision64
- Data immediately acquired and processed in Vision64
- Full functionality and operation capability of Vision64 analysis available for NanoLens AFM data

Example view of NanoLens AFM
Scanning a sample standard
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Summary

• Provided introduction to Bruker BNS and SOM business

• Brief introduction to 3D Microscopes

• Highlighted functionality and new capabilities offered in Vision64

• Gave some examples of use of these new functions to show value to users of Bruker 3D microscopes

• Questions?