Applied SEMVision™ G7
Defect Analysis System
with Purity™ II Automatic Defect Classification
20 Years of Leadership in Defect Review and Analysis

SEMVision Creates Defect Review Segment

- 2018: SEMVision G7
- 2013: SEMVision G6
- 2011: SEMVision G5
- 2007: SEMVision G4
- 2005: SEMVision G3
- 2002: SEMVision G2
- 2001: SEMVision 300
- 1998: SEMVision

Global Installed Base

>1,200 Tools
SEMVision G7 Defect Analysis System

See

✓ Advanced imaging for 3D devices
✓ Unique imaging for wafer-edge bevel and apex
✓ Next-generation optical technology for unpatterned wafer review

Classify

✓ Consistent Automatic Defect Classification (ADC) for accurate pareto
✓ New algorithms enhance machine learning
✓ Stable pareto control with focus on critical defects

Analyze

✓ Automatic engineering analysis on tool
✓ Location-based classification combines SEM image and design data
✓ Faster root cause analysis from location-based classification

Intelligent Defect Review and Classification System Speeds Time to Yield
SEMVision G7 Defect Analysis System

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SEMVision G7 Continues G6 Imaging Benchmark

- Low Energy
- HAR
- 360° Topography
- eBeam Tilt
- Resolution
- See-Through

Source: Applied Materials, Inc.
# Unique Bevel and Apex Imaging

<table>
<thead>
<tr>
<th>WHY</th>
<th>Proven correlation between bevel defectivity and wafer-edge yield</th>
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<tbody>
<tr>
<td><strong>Do we need it?</strong></td>
<td></td>
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<table>
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<tr>
<th>HOW</th>
<th>Unique telescopic SEM imaging using extreme depth of field and tilt</th>
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</thead>
<tbody>
<tr>
<td><strong>Do we do that?</strong></td>
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<tr>
<th>WHAT</th>
<th>Yield increase due to defectivity control in edge, bevel, and apex</th>
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<tbody>
<tr>
<td><strong>Is the benefit?</strong></td>
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</table>

### Diagram: WAFER PROFILE

- Defects Migrate to Edge Dies
- Edge
- Bevel
- Apex
High-Resolution Imaging of Bevel and Apex

Field of View 300µm

Both Bevel and Apex Visible in a Single Image
Next-Generation Optical Technology for Unpatterned Wafer Review

- Stronger signal with new laser source
- Enhanced detection with improved light collection
- Improved noise suppression with polarization control
- Faster review

Robust Review and Detection of 18nm Defects
SEMVision G7 Defect Analysis System

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SEMVision G6 Benchmark Auto Classification - Purity ADC

More Accurate Results, Better SPC, Shorter Time to Decision
SEMVision G7 Purity II ADC Enhances Machine Learning

Retrain Flow

Stable Performance for Dynamic Pareto

Trained Classification Engine

Pareto Change Induced by Process Change

Adaptation with Auto Machine Learning

Adapted Classification Engine

Sustained Accuracy in Dynamic Environment, Minimal Error Rate, Shorter Time to Decision
Applied Materials® – External Use

SEMVision G7 Purity II ADC Enhances Machine Learning

CDOI Extraction

Critical Defects Prioritized to Ensure Accurate Representation

- Previous SEM Tool: 100% Manual Classification
- SEMVision G6 With Purity ADC: <20% Manual Classification
- SEMVision G7 With Purity II ADC: Classification for Automatic Re-Analysis

Sustained Accuracy in Dynamic Environment, Minimal Error Rate, Shorter Time to Decision
SEMVision G7 Defect Analysis System

- Advanced imaging for 3D devices
- Unique imaging for wafer-edge bevel and apex
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See

- Consistent Automatic Defect Classification (ADC) for accurate pareto
- New algorithms enhance machine learning
- Stable pareto control with focus on critical defects

Classify

- **Automatic engineering analysis** on tool
- **Location-based classification** combines SEM image and design data
- Faster root cause analysis from location-based classification

Analyze
Design Based ADC – Beyond SEM Image Classification

Location Detail Distinguishes Defects, Speeds Root Cause Analysis, Aids Yield Prediction
SEMVision G7 with Purity II ADC

Automated, All-in-One Defect Review, Analysis, and Classification
SEMVision G7 with Purity II ADC

Automated, All-in-One Defect Review, Analysis, and Classification

Auto Classification

Start to Finish – Minutes to Complete
Applied SEMVision G7 Defect Analysis System

- **Unique imaging** for wafer-edge bevel and apex
- **Next-generation optical technology** for unpatterned wafers
- **Purity II enhanced machine learning**
  - Sustained accuracy and consistency with process changes
  - Reliability in production environment
  - Assured representation of fab-critical defects
- **Purity II location-based classification**
  - Accelerated root cause analysis
  - Improved yield prediction

Intelligent Defect Review and Classification System Speeds Time to Yield