

PROVision™ User Manual

July 2017

Revision A

P/N 0230-B9080

Applied Materials Confidential

About this Manual

1. General

The *PROVision™ User Manual* is designed for use by you, the tool owner. It is expected that you have attended a certified Applied Materials Training Course, and have received intensive On-Site training. That training, together with this manual, will provide you with the knowledge you require to work with the PROVision machines. As always, any further questions you have can be addressed to your local Applied Materials GRC

The User Manual is an ongoing project that will be continuously updated along with the PROVision tools. As new developments and ideas evolve, you can expect to receive periodical updates from GRC.

At Applied Materials, we appreciate any comments or suggestions you might have in reference to our documentation. We are constantly striving to improve the quality of our documentation and value your opinions as readers.

**NOTE**

The procedures described in this manual are to be carried out only by authorized customer engineers who have received the necessary training.

2. Conventions

2.1 Style

The following style conventions define how different terms are set off from the rest of the text.

- Commands, fields, windows, applications, features, processes, and procedures appear in Initial Capitalization.
- Buttons appear in **bold**.
- Application files appear in *italics*.
- Publication titles appear in *italics*.
- UNIX commands that the user types on screen appear in `courier`.
- UNIX output that appears on screen appear in `courier`.
- Parameters that the user types on screen appear in `<angle brackets>`.
- Entries and fields that can vary depending on the task performed will be interrupted by `<angle brackets>` to indicate that the specific value depends on the task being performed. For example:
ReadingType_<wafer size>_Inch implies that either 6”, 8”, or 12” will appear in place of <wafer size>.

- Information ant to the operation of the system but not constituting a hazard is emphasized as a Note:



The information bracketed by these lines contains ant information.

2.2 Safety

2.2.1. Safety Manual

For general safety information, refer to the *PROVition™ Safety Manual*.

The *PROVition Safety Manual* includes general safety information, without dealing with hazards in specific procedures, and material safety data sheets.

2.2.2. Safety Labels

The PROVision system includes visual alerts (warning labels) that identify potentially hazardous situations. These visual alerts appear on the tool.

Procedures that are potentially hazardous include visual alerts that identify the hazard, what can happen if precautionary measures are not taken, and the precautionary measures that are required to neutralize the hazard.

Before performing any maintenance operation, carefully read the safety labels that appear in the procedures.

The following words appear on the warning labels on the tool and throughout the manual:

- **DANGER** - indicates an imminently hazardous situation which, if not avoided, will result in severe injury or death.
- **WARNING** - indicates a potentially hazardous situation which, if not avoided, could result in severe injury or death.
- **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor injury or moderate injury or product or property damage.

Safety information indicating a potential hazard that can cause minor or moderate injury or property damage is emphasized with a Caution message:



The information in this message concerns safety.

3. List of Acronyms

The following acronyms are used in this manual:

Table 1. Acronyms

Acronym	Description
ADC	Automatic Defect Classification
ADI	After Development Inspection
ADR	Automatic Defect Review
AF	Auto Focus
AN	Accurate Navigation
API	Automatic Process Inspection
AS	Auto Stigmation
ATP	Acceptance Test Procedure
BDH	Big Defect Handler
BEOL	Back End Of Line
BF	Bright Field
BKM	Best Known Method
BL	Bit Line
BS	Boresight
BSE	Back Scattered Electrons
BW	Bare Wafer
C&F	Concept & Feasability
C2C	Cell to Cell
CAD	Computer Aided Design
CD	Critical Distance
CIP	Continual Improvement Process
CMP	Chemical Mechanical Polishing
CORBA	Common Object Request Broker Architecture

Table 1. Acronyms

Acronym	Description
CR	Capture Rate
CS	Cell Size
D2D	Die to Die
D2G	Die to Golden
DB	Database
DBB	Design Based Binning
DBCC	Digital Brightness Contrast Correct
DF	Dark Field
DI	Discrete Inspection
DM	Discrete Measurement
DOF	Depth Of Focus
DOI	Defect Of Interest
DPH	Defects Per Hour
DR	Defect Review
EBI	Electron Beam Inspection
ECR	Enhancement
EF	Energy Filter
EIQ	Enhanced Image Quality
EOU	Ease Of Use
FAR	False Alarm Rate
FC	Faraday Cup
FE	Front End
FEM	Focus Exposure Matrix
FEOL	Front End Of Line
FI	Factory Interface

Table 1. Acronyms

Acronym	Description
FOUP	Front Opening Universal Pod
FOV	Field Of View
FW	Firmware
GA	Global Alignment
GDR	Golden Die Registration
GI	Golden Image
GL	Gray Level
GUI	Graphic User Interface
HAR	High Aspect Ratio
HMS	Health Monitoring Schedule
HS	Hot Spot
HVP	High Value Problem
HW	Hardware
IFM	Interferometer
IP	Image Proccesing
ITU	Internal Transfer Unit
KLARF	KLA Result File
LLK	Load Lock
MC	Main Controller
MDC	Manual Defect Classification
MW	Microscope Window
NE	Novelty Extraction
NR	Night Run
OM	Optical Microscope
OTF	On The Fly

Table 1. Acronyms

Acronym	Description
OTW	Orbot Test Wafer
PAL	Pre Aligner
PCR	Phase Correlation Registration
PDR	Preliminary Design Review
PEARL	PDC Enhanced Accurate Review Location
PIP	Plant Intellectual Property
PM	Preventive Maintenance
PR	Pattern Recognition
PS	Pixel Size
PV	Pattern Variation
PWP	Particle Wafer Pass
PWQ	Process Window Qualification
RAPID	Runtime API Destinations
RC	Root Cause
RFQ	Ready For Qual
RMI	Remote Interface
RN	Release Notes
ROI	Region Of Interest
SE	Secondary Electrons
SEM	Scanning Electron Microscope
SNR	Signal to Noise Ratio
SOW	Scope Of Work
SPE	Server Parameter Editor
SQA	Software Quality Assurance
SRS	Software Request Specification

Overview

1. General

Welcome to the Applied Materials PROVision™ User Manual. PROVision is a resolution SEM-based metrology and inspection system. It is equipped with patented Multiple Perspective SEM Imaging™ (MPSI™) technology enabling:

- Process characterization and monitoring using a massive amount of measurements
- Defect inspection on all defect types with a high detection rate and high throughput

In addition, a set of unique and advanced SEM-based process monitoring applications are available as options to add onto the system.

PROVision seamlessly integrates in-line and engineering capabilities, performing class resolution and imaging EBI tool for the most challenging DOIs and process characterization. These engineering features include advanced SEM imaging, an integrated optical microscope, material composition analysis capabilities, and advanced image processing tools.

2. User Flow

This manual provides instructions for the AMAT/customer engineer or operator. The major topics covered in this manual are:

- **Introduction** – Starting the application, loading and unloading a wafer or cassette, checking the system status, stopping the application
- **Recipe Setup** – Enables AMAT/customer engineers to create preprogrammed inspection and metrology processes.
- **Scan and Review Results** – Enables AMAT/customer engineers to review the recipe outcome and tune accordingly. This is also used by operators to verify results after inspection runs.
- **Inspection** – Enables operators to apply the pre-programmed recipes and perform runs.
- **Fab Preferences** – Describes how to configure the tool to match its specific location and customer.
- Support applications such as the **Log Analyzer** are used to perform additional analysis.