

Getting Started with TEA Products

Contents

<p>Getting Started 1</p> <p> Contents 1</p> <p> First Product Installation 1</p> <p> From an Internet Download:..... 1</p> <p> From a TEA Product CD-rom 3</p> <p> Product Upgrade 3</p> <p> Instructions: 3</p> <p> Product Removal 4</p> <p> License Installation 4</p> <p> License Manager Startup 4</p> <p> Initial Product Startup 4</p> <p> To get a TEA Product License:..... 5</p> <p> Type of Product Licenses 5</p> <p> Product License Removal 6</p> <p> Initial Data Loading 6</p> <p> Weir Standard Data Format 6</p> <p> Data Accessible to the Weir Suite 7</p>	<p> Importing Data8</p> <p> Loading Weir Data Workbooks9</p> <p> Loading Auxiliary Data Worksheets9</p> <p> Defining an Exposure Layout and Data Centering __ 9</p> <p> Starting Weir Layout9</p> <p> Setting up a Serpentine Focus Variation10</p> <p> Adding a Constant Partial Coherence Value to the Array11</p> <p> Graphics 11</p> <p> Modifying Graphics11</p> <p> Getting There12</p> <p> Mouse Generated Graphics12</p> <p> Data Culling 12</p> <p> Hardware and Software Requirements 13</p>
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First Product Installation

You will need Administrator Privilege to install this software on your Windows based computer.

Software can be installed and used up to ten (10) times without obtaining a user’s license. To obtain a user’s license, call or email TEA Systems at Sales@TEAsystems.com after installation and provide their “ID A:” code number that will be presented to you by the Weir software.

Products and manuals can be installed directly from the internet site or by the optional CD-rom that will be sent with your order. Purchasers in California are urged to use the download method of installation.

From an Internet Download:

Getting to the Product

A user logon and password is required for these papers in the User’s section. Request a logon from TEA Systems at Sales@TEAsystems.com

- You can download full **Product Versions** from the web site at:
<http://www.teasystems.com/UserArea/Product%20Download.htm>
- **Manuals** for these products are located at:
<http://www.teasystems.com/UserArea/Manuals.htm>
- **Product literature** including General Information, Brochures, Tutorials, Papers & Presentations:
<http://www.teasystems.com/UserArea/Literature.htm>

Zip (Compressed) File Format

TEA Systems products are downloaded in “Zip” file format. Inside of each Zip container are two files:

- Setup.exe, Setup.LST and
- *ProgramName.CAB*

Where the “ProgramName” corresponds to the name of the product that you have downloaded.

Installation

- Click on the product name to download the “Zip” file to your local computer directory.
- Double-click on the Zip file to open the WinZip utility
- Either:
 - Extract the Zip-file contents into a local directory.
 - Double click on “Setup.exe” to start the installation.
- **OR** click on the “Install” button of the WinZip interface
 - Or use the WinZip “Actions/Install” menu

What’s in this Zip File?

“Zip” File	TEA Product	
WeirAnalysisProduct.zip	Product	Description
	Weir PSFM	Focus Reticle Calibration, Focus data conversion & modeling
	Weir PW	Profile and film uniformity modeling, Process windows, Dose Uniformity
	Weir Layout	Graphic exposure layout and data centering tool.
	Weir FEM	Focus Exposure Matrix (FEM) graphic manual data entry tool for collapsed lines and other Bayesian type data.
	Weir DM	Daily Monitor, Automated, one-click data analysis, modeling and trend charts
	Weir DMA	Provides automation for Weir PW/PSFM interfaces to APC and Factory Control
	WeirTR Installation.zip	Product
Weir TR		Weir TR; Temporal response analysis software for time-based metrology such as thermal sensor wafers.
Weir Matching		Match and feature or overlay data to the time-based data of Weir TR
Weir Layout		Graphic exposure layout and data centering tool.
VectorRaptorOV.zip	Product	Description

"Zip" File	TEA Product	
	Vector Raptor	Advanced Overlay and Registration control with special tools for Double Patterning and Double Exposure
	VR Matching	Match multiple feature, film and overlay data sets.
	Weir Layout	Graphic exposure layout and data centering tool.

From a TEA Product CD-rom

Weir and Vector Raptor software CD-roms are in html format.

You can access the products, manuals and tutorials using the interface controls that appear on the main screen.

Place the CD-rom into your computer. It should startup automatically. If it does not, then click on the "**Index.htm**" file.

You will need to obtain a demo license to use the software regularly. Without the license you can start the software up to 10 times before it will lock up. The license is keyed to the installation date and your computer. See the attached memo for license management and installation.

Obtaining a license is easy. When the software is first started Weir will display a License

Email Addresses:

WeirEngr@TEAsystems.com

Sales@TEAsystems.com

Product Upgrade

Product Updates and Upgrades can be downloaded directly from the TEA Systems internet site. Go to the TEA User's Area at:

<http://www.teasystems.com/UserArea/index.html>

Select the "Upgrades" command button.

Each upgrade includes a compressed self-extracting ".exe" file that can be directly installed under Window 2000, Windows Server 2003 or Windows XP. This file will self install after downloading.

Instructions:

1. Download the file into a temporary directory on the Weir or LithoWorks computer .
2. Installation:
 - o The download is a self-extracting executable file (i.e. files ending in ".exe").
 - o Simply double-click on the file to begin installation or
 - o Extract the contents of the zip file into a temporary directory.
 - o Run the "Setup.exe" program

Product Removal

To remove TEA System's Products

- 1) FIRST remove the product license if you wish to re-install the software on another computer.
 - a) Detailed steps for license removal are in the next section.
 - b) Sent the License to Sales@TEAsystems for credit.
- 2) Remove the Product from your Windows computer
 - a) Select the menu Start/Settings/Control Panel
 - b) Select the icon "Add/Remove Programs"
 - c) Select the Install/Uninstall tab.
 - d) Scroll down to the product name.
 - e) Follow the on-screen instructions. All portions of the software will be removed.

License Installation

TEA Systems products are license protected by an encrypted code that is tied to the unique hardware configuration of the installation computer.

TEA Systems can give you a new license by email that will allow you to use the software for a fixed time frame or as a permanent license.

If a product must be moved to another computer, then the license from the current computer should be removed prior to removal of the actual product. When you remove the license, using the License Manager, a License Removal Code will be given to you. Having this License Removal Code you can then send it to TEA Systems for credit for it's re-installation on the new computer.

License Manager Startup

The first time you start up the program, the TEA Systems License Manager, shown above in **Figure GS1** will appear.

After the initial installation, you can access the license manger from the "Tools/License Manager" menu of each product interface.

Initial Product Startup

See the Previous section for program installation instructions.

Program startup and license installation consists of the following steps:

1. Install the program
2. Run the program for the first time
3. The TEA Systems License manager will appear and request you to:
 - a. Enter a license ID or
 - b. Continue without entering a new License ID.

i. You can start the software ten (10) times without a license.

To get a TEA Product License:

- 1) Record the values shown in the License Manager for variables “ID A” and “ID B” .
- 2) E-mail “ID A” and “ID B” to TEA Systems at: Sales@TEAsystems.com
 - a) **OR** the software may offer to email these values for you to TEA Systems. You will be able to review the email prior to transmission.
 - b) **OR** us the “Email Request” command button shown on the License Manager shown in **Figure GS1**.

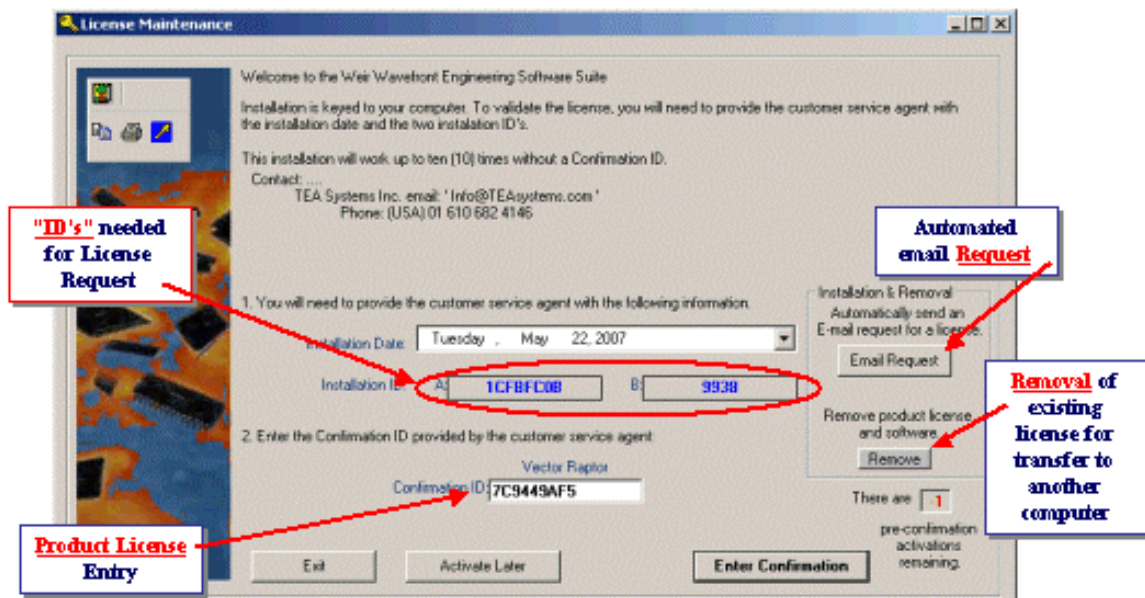


Figure GS1: TEA Systems Product License Manager Interface

- 3) TEA Systems will return a Product License to you by E-mail.
 - a) Your returned Product License will be in the form of a Hexadecimal number (Manual Update) and an attached ASCII File (Automatic Update). You may use either form to update your license
- 4) **Manual Update:** Enter the license value in the License Manager to continue running the software without interruption then press the “Enter Confirmation” command button **OR**
- 5) **Automatic Update:** Download the “License.dat” file into your Weir Program directory for automated installation.
 - **Weir Program Directory Location:** The path to your program directory can be found in the menu at “Help/About”. Use “Ctrl C”/ “Ctrl-V” to copy and paste it into the license manager.

Type of Product Licenses

TEA Systems Products offer two types of product licenses.

1. Fixed-Node License
 - a. The product is installed on a single computer and must be used on this computer.

- b. Only one user at a time may use the software.
2. Floating-Node License
 - a. The product is installed on a single computer.
 - b. The license is keyed to the installation computer.
 - c. The product may be used on any network node that can access the installation computer.
 - d. Only one user at a time may use the software.
 - e. The software instance will terminate if left inactive for ½ hour to allow it to be used by others on the network.

Product License Removal

Since the product license is keyed to the hardware of your computer, moving a TEA Product to another computer requires you to first remove the installed product license to obtain a Product Removal Key. You can remove the software by pressing the “**Remove**” button located on the left side of the License Manager interface as shown on Figure GS1.

Next install the TEA Product onto your new computer.

Email the Product Removal Key to Sales@TEAsystems.com along with the “ID A” values of your new installation to obtain a

Initial Data Loading

Weir Data is ALWAYS loaded from it’s storage in an Excel Workbook. Data is structured in the Workbook using the Weir Standard Format. The Weir Standard format is a public format and is defined in the file attached to the following link:

[Weir Standard Format.pdf](#)

Which can be found on our website at:

<http://www.teasystems.com/General/ProductOverviews.htm>

Weir Standard Data Format

Data is typically imported from a metrology tool’s binary or ASCII format data file. The data formats are then converted into the Weir Standard Format and stored into Spreadsheets. After a data set has been imported into a spreadsheet, the spreadsheet should then be opened and re-used for future work since there is no need to re-import the raw data.

Weir Workbooks store data, analysis reports, summaries and additional data created from some of the analyses. The worksheets can be located using the “Index” worksheet and it’s hyperlinks.

There’s a minimum of three worksheets stored in each workbook:

- *DataSheet* The primary, imported data as measured. The sheet-name is the same as the data set name.
- “Sites” A sheet of field locations and feature *family* information.
- “Information” Header information containing diesize, flat location etc.

Formats and conventions for these are discussed below

Data Accessible to the Weir Suite

TEA Systems Products are engineer’s tools with production script automation for wavefront engineering and semiconductor process control. Overlay, registration, critical dimension, all ellipsometer, scatterometer and film thickness data can be imported from many source formats including:

Accent Optical CDS 200 family	KLA ProData files (*.pfe)
Applied Materials (AMAT) NanoSEM 3D	NanoMetrics OCD Scatterometer family
ASML self registration files including FOCAL	Nikon NRM Series Overlay (*.msr)
BioRad Questar (several formats)	Nova Track 2020-3030 Overlay (*.csv & *.xls)
Hitachi Laxxx Overlay	OnWafer Thermal probe (*.csv) files
IVS Overlay Family (IVS 130 etc. from Schlumberger)	SensArray Thermal probe files (*.csv or *.xls stored data)
IVS CD-SEM family (IVS 230 etc. from Schlumberger)	Schlumberger Yosemite CD-SEM (*.tab, *.csv and space delimited)
KLA Archer overlay family	Therma-Wave RTCD Ellipsometer
KLA ASET F5 Ellipsometer SCD	Timbre Technologies ODP scatter analysis (*.csv and space delimited.)
KLA 5xxx Overlay family	Excel-based Focus-Dose data in table format
KLA 8xxx CD-SEM family	and others ...

Weir Engineering is always striving to expand the range of data imports and welcomes sample files from any source. Remember, there is never a charge to update or expand the list of imported data sources. If your metrology tool is not on this list then please submit a data sample for analysis.

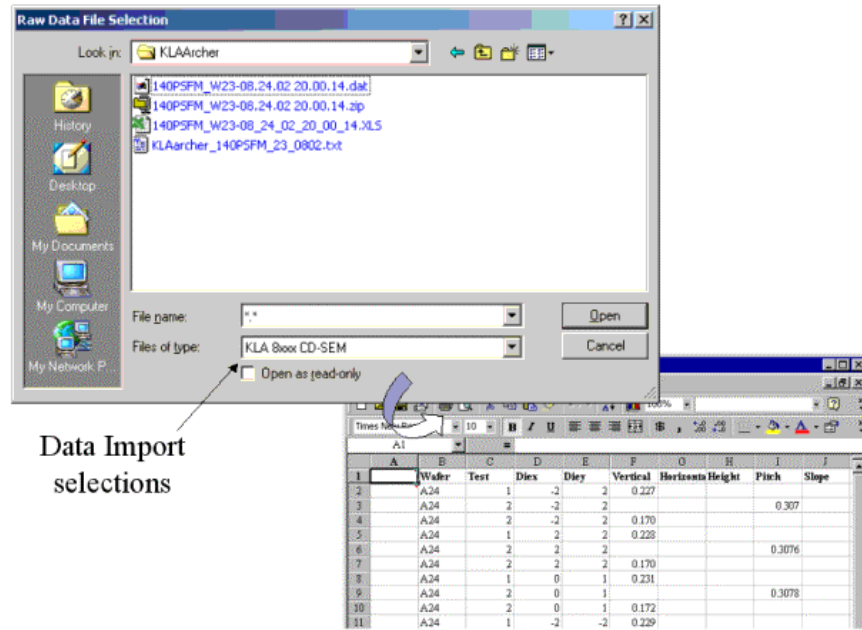


Figure Data1: Data import and conversion.

Importing Data

Metrology data can be easily imported. Data is imported and reformatted into a Weir Workbook. The Weir Workbook for the data, using the same name as the source file, is automatically and immediately loaded into the TEA Product Application. You can begin analysis without additional steps.

You can set the data import behavior options using the “Tools/Options” menu to define where data is stored and it’s behavior. For example, you can specify:

- Set a fixed data-source location or allow it to float to the last-location used.
- Set a default data import filter type
- Set the storage location of the Weir Data Workbook created from the metrology file.

After a data set is imported the first time then use it’s Weir Workbook to load the data into future product analysis sessions. You do not have to use the data import to reload data sets.

TEA Products allow data to be imported using:

- The “File/Open Data” menu to access the interface shown in Figure Data1.
- Drag and drop data files into the active TEA Product screen.
- Use the Weir DMA command line arguments in calls from other products.

The type of metrology data being loaded must be first set by using the “File/Open Data” menu. This interface remembers the directory and type of data import until you change it. After the first file is loaded, you can then use the drag-drop technique from any directory on the network. To open the data file:

- Start the TEA Product and select the “File/Open Data” menu.
- Select the data type using the “Files of type” drop-down control.
- Select the data file and then press the “Open” command button.

“File/Open” or “file open” button. Imported data is automatically converted into the Weir Standard Format and stored into a Workbook as shown in the figure. The workbook will be the

same name as the raw data file and in the same directory. Workbooks can then be renamed and moved to other locations, if desired.

Loading Weir Data Workbooks

Use the “File/Open Workbook” or “Open Workbook” button on the button-bar to load Weir Standard formatted data directly into the application. You can also drag-and-drop any Data Workbook or by using program calls from the Weir DMA interface.

Loading Auxiliary Data Worksheets

Data Worksheets are created as the result of an analysis performed. These worksheets include:

- Best Focus Uniformity
- Dose Uniformity Analysis
- Feature Focus Uniformity Analysis
- Etc.

To load a worksheet, first load the parent data workbook. The worksheets that contain data are listed in a drop-down control located in the upper right side of the interface. Simply select a datasheet from this dropdown to reload the auxiliary data sheet.

Defining an Exposure Layout and Data Centering

Weir Layout provides access to: Exposure Layout, Wafer & Field Centering, Die-Size, Wafer Size, Wafer & Field offsets, Lot overhead information.

Weir Layout is a graphic interface used to define the organization of exposure, overhead and centering layouts in the lot. Exposure layouts can be defined for a single wafer or across multiple wafers in the lot.

Layouts can be saved as Weir Layout Templates using the “File” menu command of the same name. New data sets without exposure layout information AND Weir DM datasets can then be updated by selecting the appropriate Weir Layout Template from the “File” menu sub-command of any TEA Product Interface.

Exposure Layouts include the Field-by-Field specific location of each exposure as referenced to its position in the lot. Exposure variables setup can include the Focus, Dose, Numeric Aperture (NA), Inner Partial Coherence (PCinner or Inner Sigma), Outer Partial Coherence (PCouter or Outer Sigma) and reticle stage travel direction. While any alphanumeric value can be inserted for these values, the focus and dose values are critical if a focus/dose process window, dose uniformity or focus uniformity calibration is to be performed.

The exposure values of each field can be directly entered onto the field-graphic and then saved using the “Save” command button. Automated entry tools for standard layout configurations including the serpentine layout are located to the left of the wafer-graphic.

Layout information is stored in the Weir Workbook associated with the data under the “Layout” worksheet.

Starting Weir Layout

The Weir Layout interface can be started directly from the Windows Start Menu. You can also access it from any TEA Product “Layout, Array Centering” submenu of either the Analysis or Tools menu.

Setting up a Serpentine Focus Variation

In this section we will go through a step-by-step account, illustrating how the exposure values of a focus-dose matrix array can be specified using the automated layout controls of the Weir Main screen. For this example, we want to specify a serpentine variation in focus across the wafer starting at 0.6 microns defocus in the lower left and stepping from right-to-left in 0.1 um increments. Follow the text boxes illustrated in Figure WL1

Note: Values will be added to ALL wafers of the data set unless you first manually select an individual wafer from the “Wafer” drop-down control.

Use the File/Open menu to select and import the data.

- 1) Select the “Layout” tab.
- 2) Press “Draw” to display the previously-centered array.
- 3) Change the “format” to “Serpentine”
- 4) Change “fo” (initial focus) to 0.6 and and “Step” to -0.1
- 5) Double-click on the outer die, selecting it as the origin.
- 6) Select the relative location and travel direction of the array you will be filling. In this case, click the origin button located as shown. For this location, fields to the left and then upward of the origin die (step 5) will be filled in.
- 7) Click on “Update” to fill in the array values. Then click “Save” to save the data to the “Layout” spreadsheet.

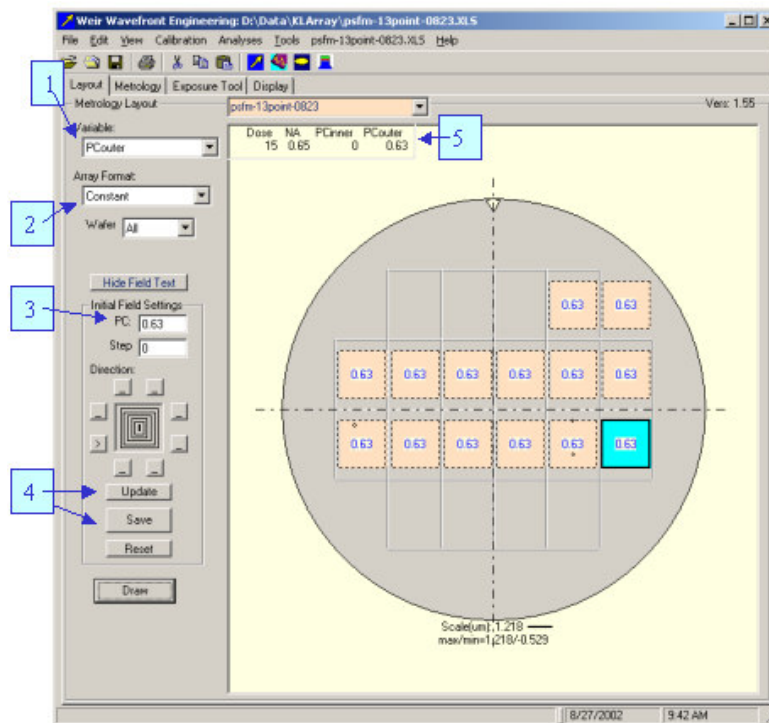


Figure WL2: Specifying constant Partial Coherence in the layout.

Adding a Constant Partial Coherence Value to the Array

Now that we have set up the focus, we desire to specify a constant Sigma or Partial Coherence (PC) for all die in the data set. Note that if PC varies from wafer to wafer, you need to first select the appropriate wafer ID from the dropdown list. Refer to Figure WL2 for this exercise.

- 1) Select the “PC_outer” variable
 - *Note PC inner is used to define “ring” and other apertures.*
- 2) Change the “format” to “Constant”
- 3) Change “PC” (initial sigma) to 0.63.
 - *“Step” will automatically change to 0 because of the “Constant” setting.*
 - *With Constant settings, it is not necessary to set an origin die.*
- 4) Click on “Update” to fill in the array values. Then click “Save” to save the data to the “Layout” spreadsheet.
- 5) Check that the Dose, NA etc values are correct. You can reset these values in the same manner as this by changing the “Variable” field. This field will add additional rows as additional-unique values are added to the array.

Graphics

Modifying Graphics

Graph colors, line-weight, display range, scale, format, titles and fonts can be interactively modified by clicking on the graphic using the right mouse-button.

Trend and XY plots can access all of the above plus the user can also add and modify:

- on-plot messages
- plot-symbols,
- line and axes weight, color
- box-plots, population color-coding and population contour lines
- Trend-lines fitted to any existing data curve of the graph with up to a 4th order polynomial.

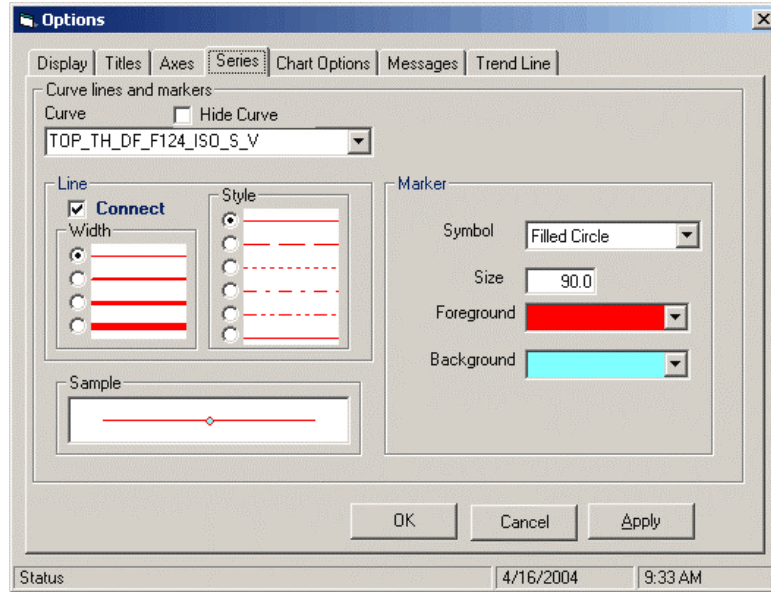


Figure Graphic1: Graph Options customization screen

Getting There

“Right Click” on the graphic using the right button of the mouse the interface shown in Figure will appear. Use the command tools in this interface to modify the graphic. More details are located in the product manual.

This interface is available from any graphic. Select the tabs to modify the screen background, titles or curve symbols. Clicking the “Apply” command button will submit the changes to the current graph without exiting the screen.

Mouse Generated Graphics

When the mouse is moved over an XY graph, the value of the data and location on the graph is shown in a pop-up bulletin.

Use the left-mouse button to box in a section of data. When the box is drawn, a pop-up menu will appear that will allow you to:

- Rescale an XY graphic by extending the box over one or two axes of the graph.
- Cull data points located within the box.
- Cull full-wafers of data.
- Restored culled data points
- Examine the boxed-in data points by displaying them in a spreadsheet pop-up.
- Create a histogram or XY plot of the selected data.

Data Culling

Data Culling can occur on many levels. Data points are never actually deleted but can always be easily restored.

- The first interface in most TEA Products allows the user to select sub-sets of data using the drop-down controls. These controls allow the analysis to be restricted to:

Getting Started with TEA Products

- Selected wafers of the lot.
- Selected “Families” of data as defined on the “Sites” worksheet.
- Selected values of the Scan Direction, Numeric Aperture, Sigma/Ring Aperture, Focus, Dose.
- Delete a specific field site or group of sites on the field by boxing in the field site on the Site Layout graphic with the mouse.
- Delete specific data measurements by boxing in data points on the wafer graphic.
- Restrict data to a range of values using any data variable. This control also contains a simple histogram generator to assist in determining the realistic variable range.
- On the “Spatial” mapping sections of the products, restrict data to data points located within a specified radius of the wafer center. This control also contains a set of graphics to show the radial distribution of variables on the wafer.
- Restrict data that is included in the analysis using a given Range and/or Sigma distribution value to limit the maximum variation of the data from the population median. A set of “Range” and “Sigma” data distribution plots can be generated using the Range Command button.
-

Hardware and Software Requirements

- Requires Microsoft Windows 2000 or Window XP. Microsoft Excel® is also required for storage of data. Minimum recommended Hardware:
- Display with 1024 x 768 pixels resolution
- Pentium III, 1 GHz or greater
- 128 Meg. RAM or more
- 50 Meg. In program directory
- 2 Gigbyte Data directory
- Microsoft Excel from Office 2000 or later
- VBA, Macro interface add-in must be installed for remote control by Weir
- Windows 2000, Windows Server 2003, XP Professional