DELTA
X-Ray Fluorescence Analyzers
PC Software User Interface Guide

Canadian edition

DMTA-10037-02EN — Revision A
September 2013

This instruction manual contains essential information on how to use this Olympus product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed.

Keep this instruction manual in a safe, accessible location.

Olympus NDT, 48 Woerd Avenue, Waltham, MA 02453, USA

This document was prepared with particular attention to usage to ensure the accuracy of the information contained therein, and corresponds to the version of the product manufactured prior to the date appearing on the title page. There could, however, be some differences between the manual and the product if the product was modified thereafter.

The information contained in this document is subject to change without notice.

Canadian edition
Part number: DMTA-10037-02EN
Revision A
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Table of Contents

List of Abbreviations

ACEA	Advisory Committee on Environmental Aspects
CSV	comma separated value
IEC	International Electro-technical Commission
LE	light element
MN	match number
PD	packaging directive
PMI	positive materials identification
PPM	parts per million
RoHS	Restriction of Hazardous Substances
SDD	silicon drift detector
UI	user interface
WEEE	Waste Electrical and Electronic Equipment

Important Information — Please Read Before Use

Intended Use

The DELTA family of handheld XRF analyzers are designed to perform identification and analysis of elements contained within test samples, from magnesium to uranium (Mg to U), depending on the selected model.

CAUTION

Do not use the DELTA for any purpose other than its intended use.

Instruction Manual

This instruction manual contains essential information on how to use this Olympus product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed.

Keep this instruction manual in a safe, accessible location.

Safety Symbols

The following safety symbols might appear on the instrument and in the instruction manual:

General warning symbol

This symbol is used to alert the user to potential hazards. All safety messages that follow this symbol shall be obeyed to avoid possible harm or material damage.

High voltage warning symbol

This symbol is used to alert the user to potential electric shock hazards greater than 1000 volts. All safety messages that follow this symbol shall be obeyed to avoid possible harm.

Safety Signal Words

The following safety symbols might appear in the documentation of the instrument:

DANGER

The DANGER signal word indicates an imminently hazardous situation. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in death or serious personal injury. Do not proceed beyond a DANGER signal word until the indicated conditions are fully understood and met.

WARNING

The WARNING signal word indicates a potentially hazardous situation. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in death or serious personal injury. Do not proceed beyond a WARNING signal word until the indicated conditions are fully understood and met.

CAUTION

The CAUTION signal word indicates a potentially hazardous situation. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in minor or moderate personal injury, material damage, particularly to the product, destruction of part or all of the product, or loss of data. Do not proceed beyond a CAUTION signal word until the indicated conditions are fully understood and met.

Note Signal Words

The following safety symbols could appear in the documentation of the instrument:

IMPORTANT

The IMPORTANT signal word calls attention to a note that provides important information, or information essential to the completion of a task.

NOTE

The NOTE signal word calls attention to an operating procedure, practice, or the like, which requires special attention. A note also denotes related parenthetical information that is useful, but not imperative.

TIP

The TIP signal word calls attention to a type of note that helps you apply the techniques and procedures described in the manual to your specific needs, or provides hints on how to effectively use the capabilities of the product.

Warranty Information

Olympus guarantees your Olympus product to be free from defects in materials and workmanship for a specific period, and in accordance with conditions specified in the *Olympus NDT Terms and Conditions* available at http://www.olympus-ims.com/en/terms/.

The Olympus warranty only covers equipment that has been used in a proper manner, as described in this instruction manual, and that has not been subjected to excessive abuse, attempted unauthorized repair, or modification.

Inspect materials thoroughly on receipt for evidence of external or internal damage that might have occurred during shipment. Immediately notify the carrier making the delivery of any damage, because the carrier is normally liable for damage during shipment. Retain packing materials, waybills, and other shipping documentation needed in order to file a damage claim. After notifying the carrier, contact Olympus for assistance with the damage claim and equipment replacement, if necessary.

This instruction manual explains the proper operation of your Olympus product. The information contained herein is intended solely as a teaching aid, and shall not be used in any particular application without independent testing and/or verification by the operator or the supervisor. Such independent verification of procedures becomes increasingly important as the criticality of the application increases. For this reason, Olympus makes no warranty, expressed or implied, that the techniques, examples, or procedures described herein are consistent with industry standards, nor that they meet the requirements of any particular application.

Olympus reserves the right to modify any product without incurring the responsibility for modifying previously manufactured products.

Technical Support

Olympus is firmly committed to providing the highest level of customer service and product support. If you experience any difficulties when using our product, or if it fails to operate as described in the documentation, first consult the user's manual, and then, if you are still in need of assistance, contact our After-Sales Service. To locate the nearest service center, visit the Service Centers page at: http://www.olympus-ims.com.

1. DELTA PC Software Configuration

DELTA PC Software allows you to control a connected DELTA analyzer from a personal computer. DELTA PC Software is particularly useful for controlling the DELTA when it is secured to a portable workstation. The PC software also provides options for data manipulation and storage. DELTA PC Software is available on the USB drive included with your analyzer.

Before using the DELTA PC Software, make sure the following are available:

- The latest DELTA PC Software version installed on your PC.
- Microsoft ActiveSync 4.5 for Windows XP or Windows Mobile Device Center.
- A USB connection to your instrument. The data cable length should not exceed 3 meters (10 feet).
- A CalCheck coupon (P/N 100039).

1.1 Profile Manager

The profile manager allows you to start DELTA PC Software and manage the profile of a single or multiple DELTA analyzers. You can:

- Import a DELTA analyzer software profile from a DELTA to a PC.
- Import DELTA analyzer data from a DELTA to a PC.
- Export a DELTA analyzer software profile from a PC to a DELTA.
- Export Empirical Mode models from a PC to a DELTA.
- Close the connected device application.

Before using a DELTA with the PC software for the first time, you must use the profile manager to import the connected analyzer's software profile to the PC.

To make an initial connection between a DELTA analyzer and the DELTA PC software

1. Connect your DELTA to the PC USB port.
2. On the desktop, double-click the DELTA PC Software icon ()to display the profile manager.
3. In the profile manager, note the serial number of the connected DELTA in the **Connected Instrument SN** box (see Figure 1-1 on page 6).
4. If you see a message indicating that the Innov-X software is running on the DELTA, click the **Close Device App** button.

   When the application software on the DELTA is closed, control of the DELTA is transferred to the DELTA PC Software.

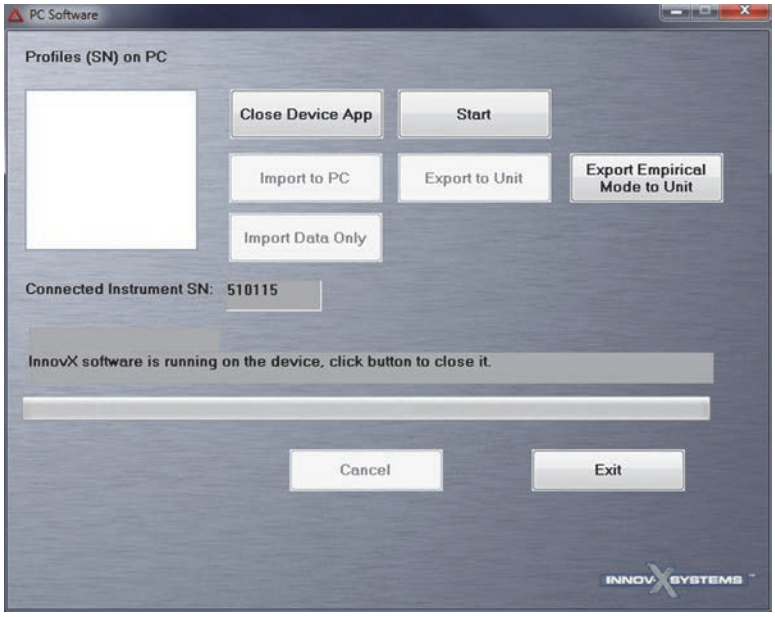


Figure 1-1 Profile manager – the initial window

5. Click **Import to PC**.
   The DELTA configuration profile is imported to the PC. The message **Importing files**, the path name of the file currently being imported, and a progress bar are displayed while the import occurs. The serial number of the DELTA appears in the **Profiles** area. (see Figure 1-2 on page 6).

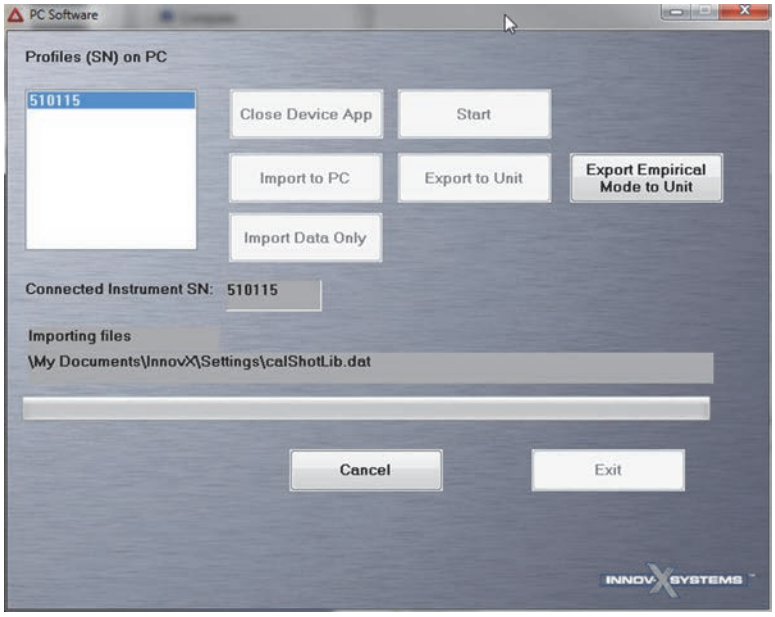


Figure 1-2 Profile manager – importing files

6. Click **Start** to close the profile manager and open the DELTA PC Software **Log In** window.

To reconnect a DELTA analyzer to the DELTA PC Software

1. On the desktop, double-click the DELTA PC Software icon ()to display the profile manager.
2. Connect your DELTA to the PC USB port.

   Wait until Microsoft ActiveSync or Windows Mobile Device Center verifies that your DELTA is connected.
3. In the profile manager, verify that the serial number of the connected DELTA and the serial number in the **Connected Instrument SN** box match.
4. If you see a message indicating that the Innov-X software is running on the DELTA, click the **Close Device App** button.

   When the application software on the DELTA is closed, control of the DELTA is transferred to the DELTA PC Software.
5. Click **Start** to close the profile manager and open the DELTA PC Software **Log In** window.

1.2 Starting the DELTA PC Software

To start the DELTA PC Software

1. Connect a DELTA analyzer to the PC using the profile manager. See “Profile Manager” on page 5.
2. In the **Log In** window, type a **User Name** and **Password**, and then click **Login** (see Figure 1-3 on page 7).

   The default user name is **innovx**. The default password is **1776**.

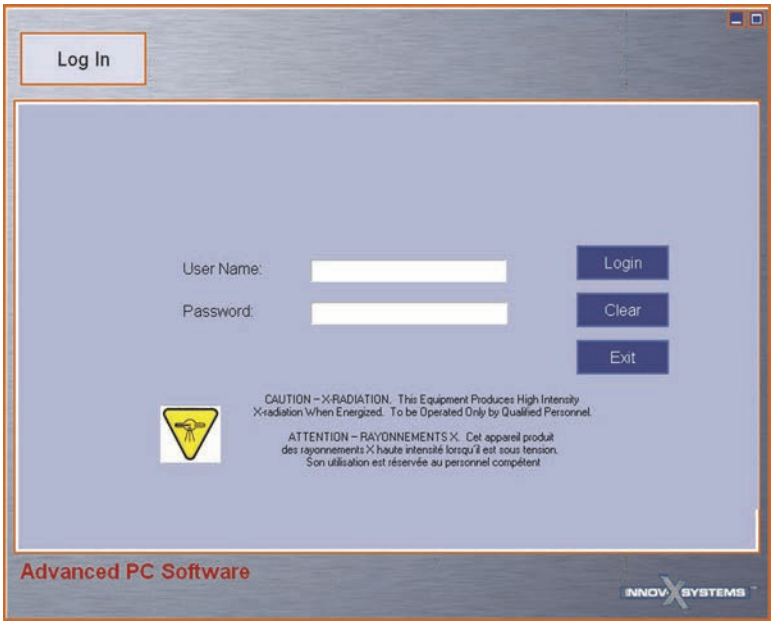


Figure 1-3 The DELTA PC Software Log In window

1.3 DELTA PC Software Overview

The DELTA PC Software user interface (UI) displays five buttons across the top (**Logout**, **Analysis**, **View Data**, **Mode,** and **Set Up**), and two buttons on the bottom (**Cal Check** and **Start**). These buttons control access for managing the entire Olympus DELTA XRF application (see Figure 1-4 on page 8, and Table 1 on page 8).

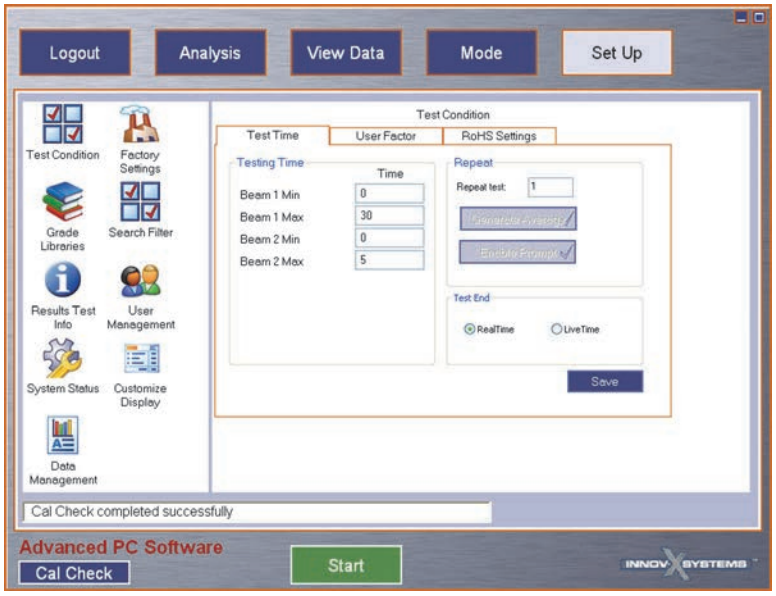


Figure 1-4 The DELTA PC Software user interface

Table 1 User interface button descriptions

Button Name	Description
Logout	Logout and display the **Log In** window, where you can log onto or exit the DELTA PC Software.
Analysis	Displays the **Analysis** window, where you can run tests. The Analysis window is equivalent to the Test Screen on the DELTA analyzer. See chapter 7 on page 95 for more information.
View Data	Displays the **View Data** window, where you can view and analyze test results. The View Data window is equivalent to the Results screen on the DELTA analyzer. See chapter 8 on page 105 for more information.
Mode	Displays the **Mode** window, where you can select available modes. See section 1.4 on page 9 for more information.
Set Up	Displays the **Set Up** window, where you can configure modal and system-wide setup options. See section 1.5 on page 9 for more information.
Cal Check	Performs a calibration check. See “Conducting a Calibration Check” on page 96 for more information.
Start	Starts a test.

Also, at the bottom of the UI are:

- A message box to display system messages.
- An Innov-X Systems icon (). Double-click this icon to display the **Hardware Status** pane (see "System Status" on page 19).

1.4 Mode

The Mode window allows you to select from the available modes. The Mode window also displays a list of all the analysis elements that are provided by the chosen mode and its associated beam(s).

To set the current mode

◆ On the left side of the window, click a mode icon (see Figure 1-5 on page 9).

Your selection is confirmed by the analysis elements information displayed on the right side of the window. The currently selected mode is also displayed in the status bar at the bottom of the DELTA PC Software window.

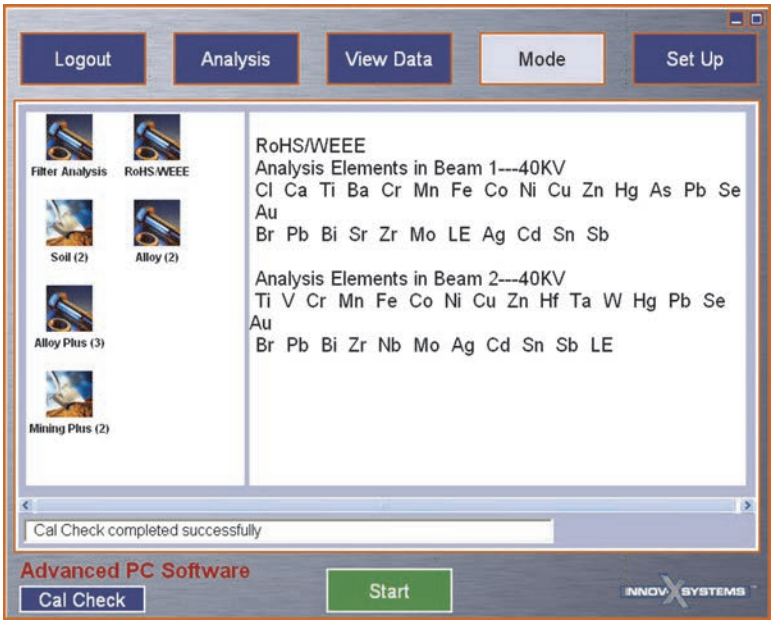


Figure 1-5 The Mode window

1.5 Setup

Mode-specific and system-wide setup functions are accessed from the **Set Up** window (see Figure 1-6 on page 10).

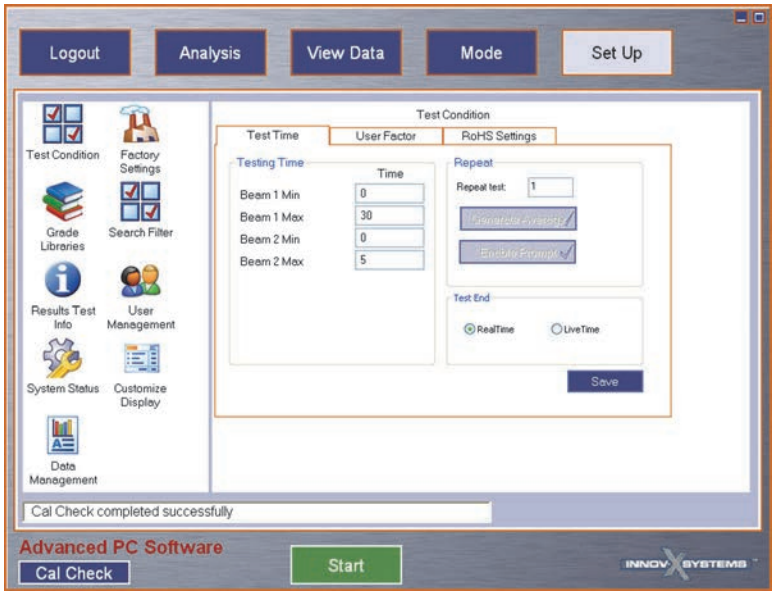


Figure 1-6 The Set Up window

Functions available in the Set Up window

Table 2 Available Functions

Button	Name	Description
	**Test Condition**	Mode-specific function — Use to configure all the test parameters for the currently selected mode.
	**Grade Libraries**	Mode-specific function — Use to load, edit, and manage grade libraries. Grade libraries are only used in the Alloy and Alloy Plus modes.
	**Results Test Info**	System-wide function — Use to create test labels containing text that can be displayed on the screen after a test is run.
	**System Status**	Use to display information about the state of the DELTA hardware.
	**Data Management**	System-wide function — Use to configure printing and data export options.
	**Factory Settings**	System-wide function — Use to alter some of the system settings set at the time of manufacture — Most factory settings never need to be changed.

Table 2 Available Functions *(continued)*

	**Search Filter**	System-wide function — Use to filter elemental & test info searches.
	**User Management**	System-wide function — Use to apply administrator and operator user privileges.
	**Customize Display**	Mode-specific function — Use to set the display parameters and screen behavior for the selected mode and to configure the display of trending data.

1.5.1 Test Condition

The Test Condition function allows you to set the conditions for any testing done for the currently selected mode. Since the test conditions change for each mode, the **Test Condition** pane for each mode is described in detail in the chapter devoted to that mode (or mode family).

1.5.2 Grade Libraries

The Grade Libraries function accesses the grade library management capability. The grade library management capability is only available in the Alloy and Alloy Plus modes, and is described in detail in “Alloy, Alloy Plus, and Precious Metals Test Conditions” on page 45.

1.5.3 Results Test Info

The Results Test Info function allows you to create up to eight test labels. Test labels contain text that can be displayed on the Analysis window or **View Data** window after a test is run, and can be exported with the result.

NOTE

When a portable GPS unit is connected to the analyzer, test labels seven and eight are used to record the longitude and latitude values.

There are three styles of test labels:

- Text — The text typed in the **Name** box is the actual label text.
- Fixed List — Includes a **Name** box (same as the Text style) and a **Data** box.
- Auto Incrementing Number — After a test is run, the value in the data field increments by a preset number.

To navigate to the Test Label Setup pane

1. Click the **Results Test Info** icon ( ) to display the **Test Info** pane (see Figure 1-7 on page 12).
   The **Test Info** pane displays the current test information settings.

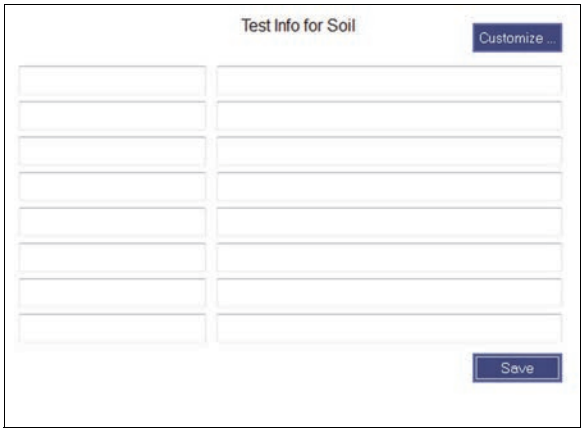


Figure 1-7 The Test Info pane

2. Click **Customize** to display the **Test Label Setup** pane.
   In the **Test Label Setup** pane, there are eight rows of available fields (Test Label 1...8). Each field is initially enabled (the default setting), which indicates that the field will be displayed after a test.
3. In the **Test Label** area, click the **Test Label** list, and then choose a label number (see Figure 1-8 on page 12).
4. Click the **Style** list, and then choose one of the three styles:
   - **Text**
   - **Fixed List**
   - **Auto Incrementing Number**

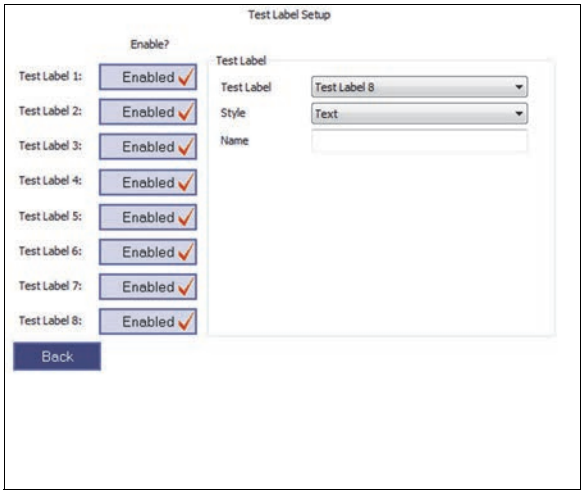


Figure 1-8 The Test Label Setup pane

To set up the Text style

1. To set up the **Text** style, click the **Name** box, and then type a name (see Figure 1-9 on page 13).
2. When you are done making changes in the **Test Label Setup** pane, click **Back** to view your changes, and then click **Save**.

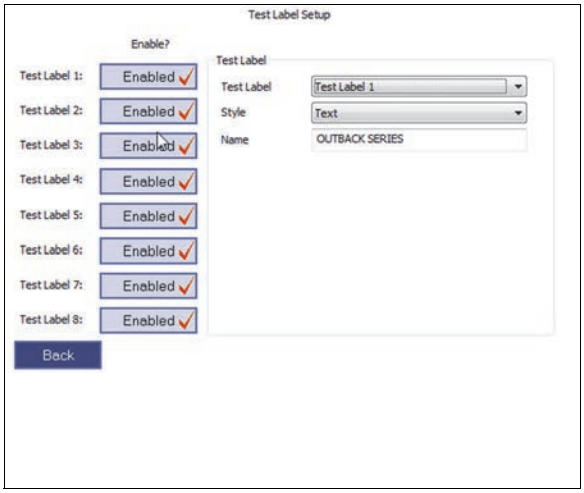


Figure 1-9 The Text style setup

To set up the Fixed List style

1. Click the **Name** box, and then type text (see Figure 1-10 on page 13).
2. In the **Data to add** box, type a line of data, and then click **Add**.
   Add as many lines of data as necessary.
3. To delete a line of data, select the data, and then click **Delete**.
4. When you are done making changes in the **Test Label Setup** pane, click **Back** to view your changes, and then click **Save**.

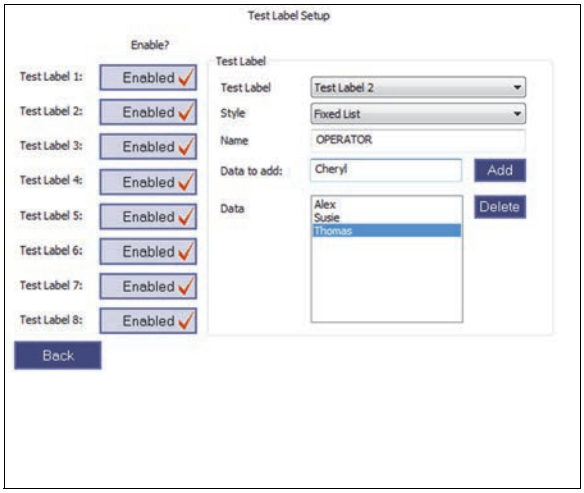


Figure 1-10 The Fixed List style setup

To set up the Auto Incrementing number

NOTE

In the **Style** list, the **Auto Incrementing Number** option causes the value in the data box (on the Analysis window at test time) to increment by the number entered in the **Step** box.

1. Click the **Name** box, and then type text (see Figure 1-11 on page 14).
2. Type a number in the **Step** box to set the incremental value (default is **1**).

   If the value entered in the **Step** box is 1, then the value displayed in the Analysis window will increment by one after each test. So, the tests will be numbered: 1, 2, 3, 4, etc. If the value in the **Step** box is 2, then the tests will be numbered 1, 3, 5, 7, etc.
3. Click **Back** to return to the **Test Label Setup** pane.
4. Enter a number of the starting test in the box that corresponds to the **Name** box defined in step 1 above.
5. When you are done making changes in the **Test Label Setup** pane, click **Back** to view your changes, and then click **Save**.

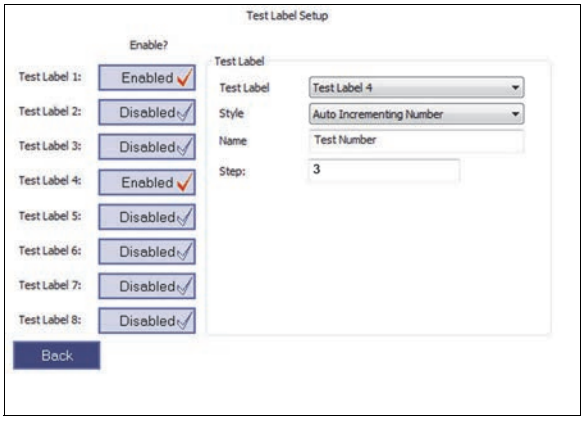


Figure 1-11 The Auto Incrementing Number style setup

The following examples demonstrate a sequence of three test screens when the Auto Incrementing **Step** is set to 3, and the (initial) **Value** is set to 1. See Figure 1-12 on page 15, Figure 1-13 on page 15, and Figure 1-14 on page 15.

Figure 1-12 Auto Incrementing test one of three

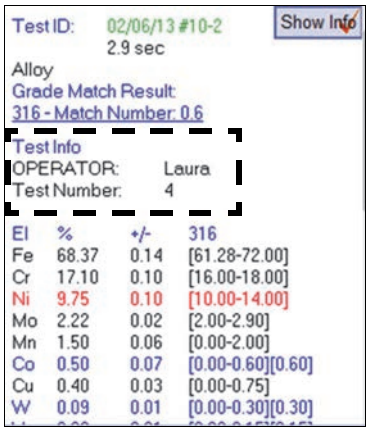


Figure 1-13 Auto Incrementing test two of three

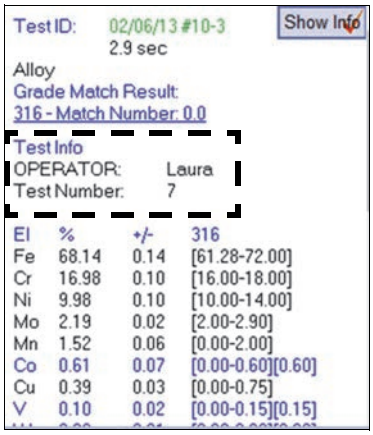


Figure 1-14 Auto Incrementing test three of three

To disable a text label

- Click the **Enabled** button to change it to **Disabled** (see Figure 1-15 on page 16).

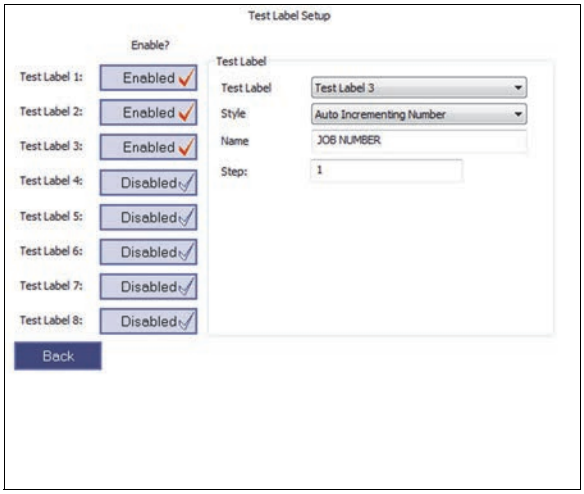


Figure 1-15 Disabled test labels in Test Label Setup pane

A disabled box is marked in the **Test Info** pane as "Label Not Enabled." See Figure 1-16 on page 16.

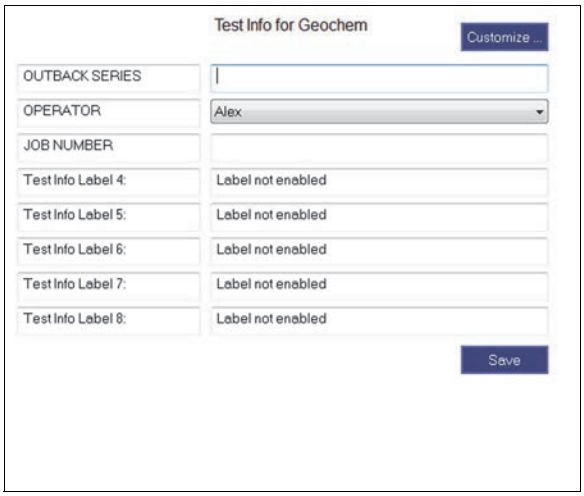


Figure 1-16 Disabled test labels in Test Info pane

To view test labels when in the Analysis window or View Data window

- Click **Show Info**.
  The check mark on the **Show Info** button turns red, and the test label information is displayed.

To edit test labels before a test is run

1. Click **Set Up**, and then click the **Factory Settings** icon ( ).
2. On the **Factory Settings** pane, click **Hardware/Misc Settings** (see Figure 1-17 on page 17.

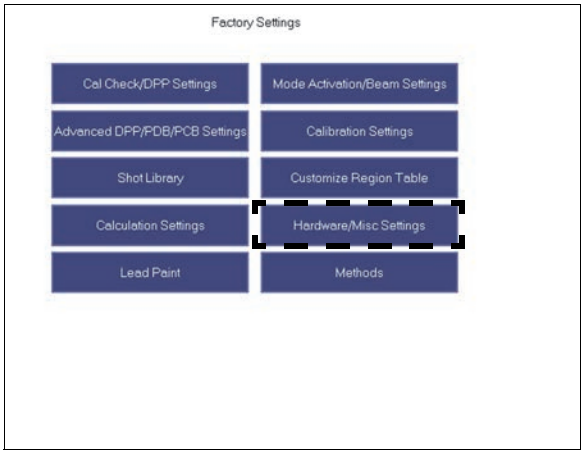


Figure 1-17 The Factory Settings pane

3. Under **Admin Prefs**, select **Force Test Info** (see Figure 1-18 on page 17)
   Force Test Info forces you to edit the test label before the test is run.

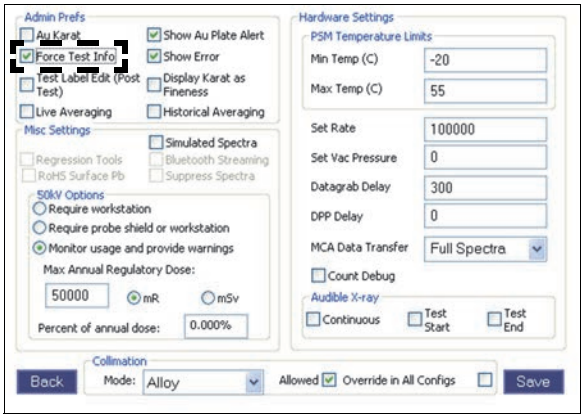


Figure 1-18 Misc settings – Force Test Info check box

To edit test labels after tests are run

1. Click **Set Up**, and then click the **Factory Settings** icon ( ).
2. On the **Factory Settings** pane, click **Hardware/Misc Settings**.
3. Under **Admin Prefs**, select the **Test Label Edit** (Post Test) check box (see Figure 1-19 on page 18).
   This selection allows you to edit and save test results information in the **Results Test Info** pane.
   Click **Save**.

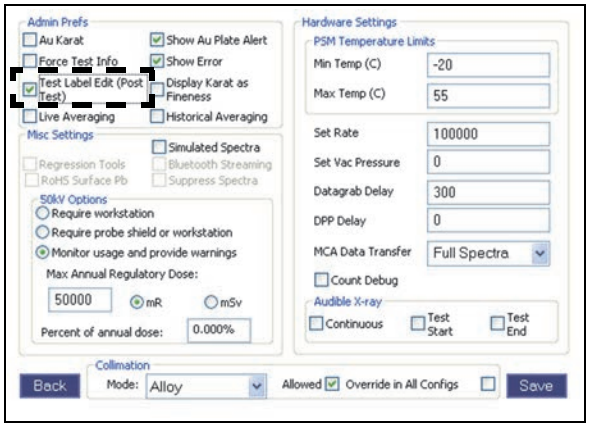


Figure 1-19 Post test label edit

4. In the **View Data** window, select a test using the **Prev** or **Next** buttons.
5. Click the ellipsis button (...) to return to the **Results Test Info** pane.
6. Edit the results.
7. Click **Save**.

   The sequence of screens (Figure 1-20 on page 18, Figure 1-21 on page 19, and Figure 1-22 on page 19) show a label generated during a test, the test label editing procedure, and the label as it appears after editing.

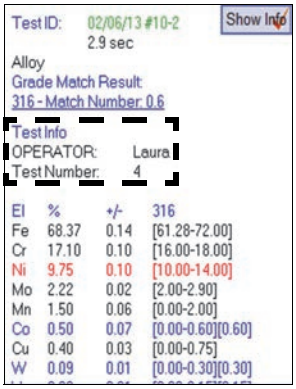


Figure 1-20 A label generated during a test

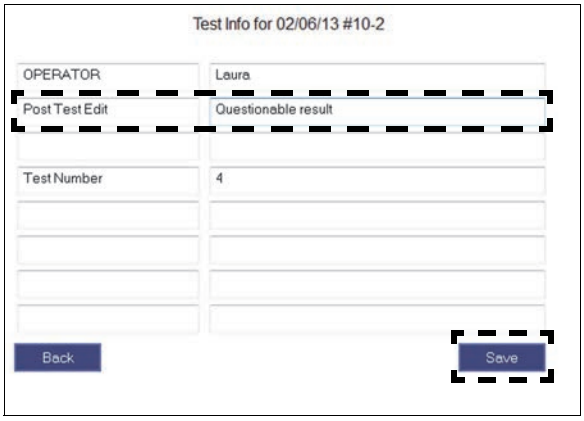


Figure 1-21 The post test label editing procedure

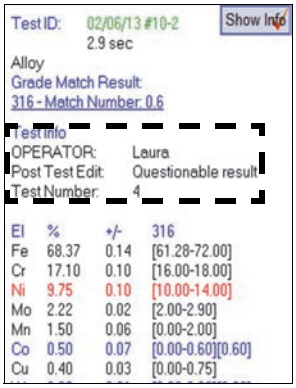


Figure 1-22 An edited label

1.5.4 System Status

The **System Status** function displays information about the state of the DELTA hardware.

To view hardware status or error log information

1. Click the **System Status** icon ( ) to display the **Hardware Status** pane (see Figure 1-23 on page 20).

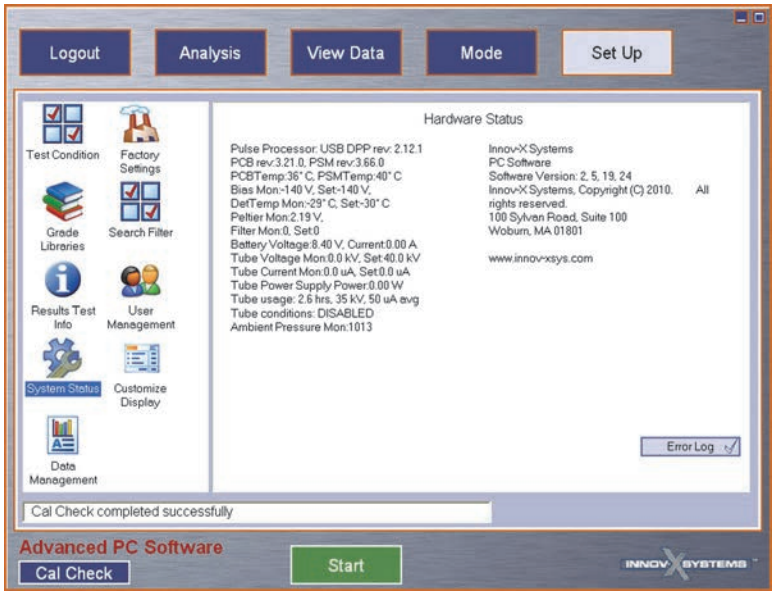


Figure 1-23 The Hardware Status pane

2. Click the **Error Log** button (Error Log) to display the **Error Log** information.

   The check mark on the Error Log button changes to red to indicate that the **Error Log** pane is currently displayed (see Figure 1-24 on page 20).

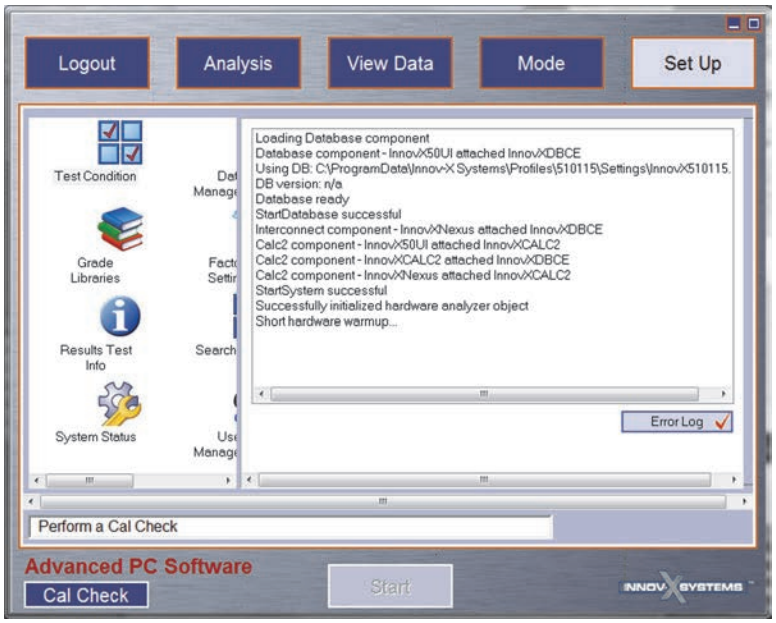


Figure 1-24 The Error Log pane

1.6 Data Management

There are three tabs on the **Data Management** pane:

- **Result Export**
- **Print Setup**
- **Multi Print**

The **Result Export** tab allows you to save result set information to a file. The **Print Setup** tab allows you to select the data you want included in the printed output. The **Multi Print** tab allows you to select the result sets that you want to print.

To view the **Data Management** pane, click the **Data Management** icon ( ).

1.6.1 Result Export Tab

Results can be exported normally or automatically. **Normal Export** allows you to export one or more (or all) of the existing results sets to a file. The file is not created until you click the **Export** button. **Auto Export** automatically exports a result set immediately after a test is run.

Results are grouped by date. An individual result recorded on a particular day cannot be exported to a file or deleted. Only results for an entire day, multiple days, or for a selected mode can be exported or deleted.

To export results normally

1. Click the **Data Management** icon to display the **Data Management** pane (see Figure 1-25 on page 21).
2. Click the **Result Export** tab.
3. Choose **Data** or **Spectra** as the default result format.
4. To include any associated images, select the **Export Image** check box (requires an analyzer equipped with the optional camera).

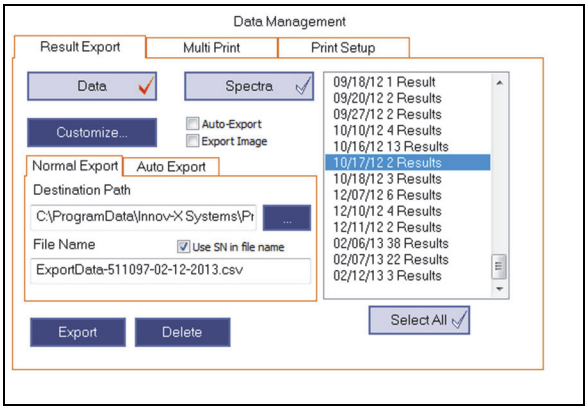


Figure 1-25 The Data Management – Result Export tab

5. Select the **Normal Export** tab.
6. In the **Results** list, results sets are grouped by date. Click one or more dates to select specific results sets for export (see Figure 1-26 on page 22).

   All the records for the selected dates are exported. You can also click **Select All** to select the entire list of results.

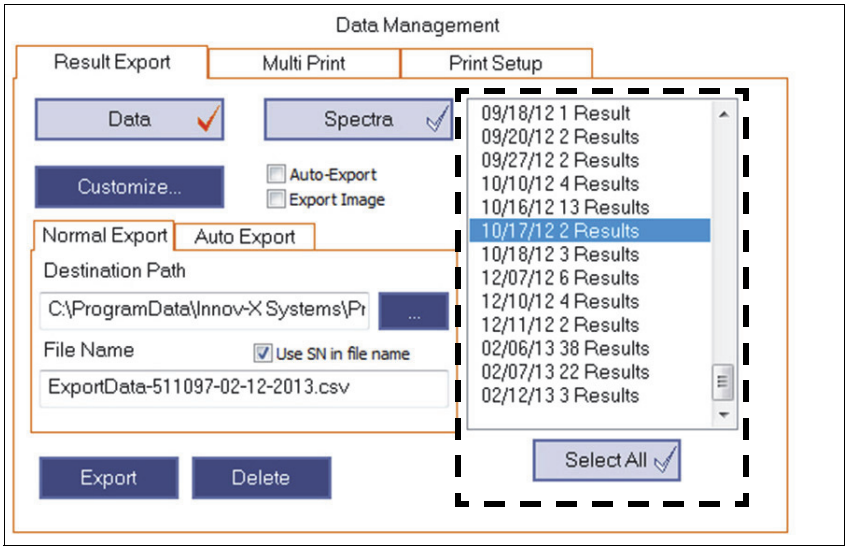


Figure 1-26 Data Management – Results list

7. If you wish to change the default destination path, click the ellipsis button (...) and use the **Save As** dialog box to specify a new **Destination Path** (see Figure 1-27 on page 22).
8. If you wish to change the default file name, type a name in the **File Name** box.
9. Select the **Use SN in file name** check box to include the analyzer serial number in the file name.

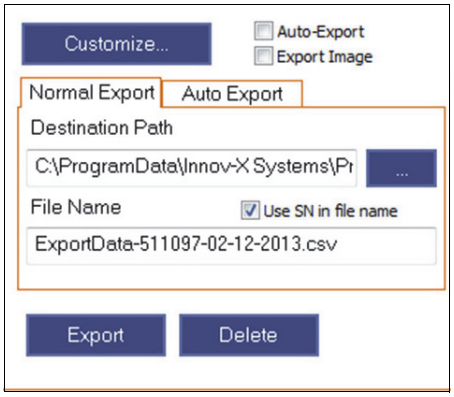


Figure 1-27 The Normal Export tab

10. Click **Export** to export the results.
11. To delete results sets from the export list, select one or more result records from the **Results** list (see Figure 1-28 on page 23).

    You can also use the **Select All** button to select all the results sets for the selected mode.
12. Click the **Delete** button to delete the selected results sets.

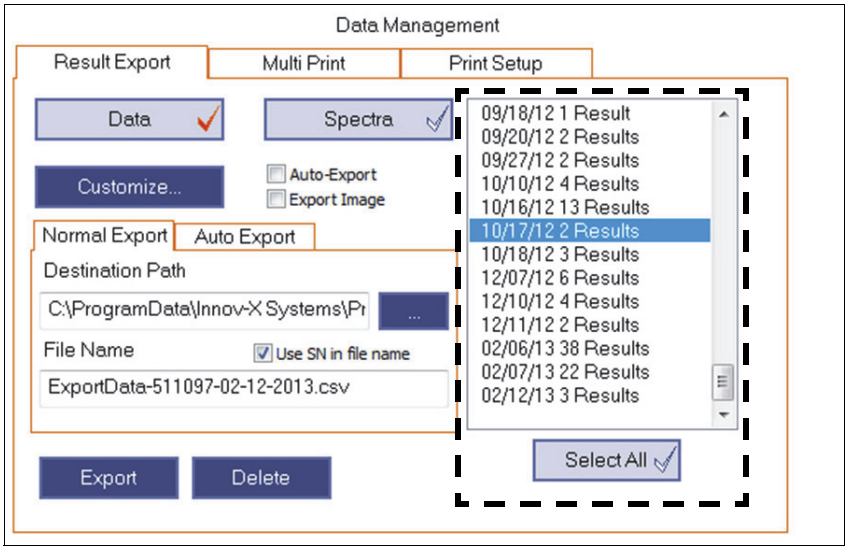


Figure 1-28 Data Management – Results list

To set up automatic export of results

1. Select the **Auto-Export** check box (see Figure 1-29 on page 23).
2. Select the **Auto Export** tab to export each result set immediately after the test is run.
3. If you wish to change the default destination path, click the ellipsis button (...) and use the **Save As** dialog box to specify a new destination path.
4. If you wish to change the default file name, type a name in the **File Name** box.
   The file is saved under the name in the **File Name** box.
5. Select the **Use SN in file name** check box to include the analyzer serial number in the file name.

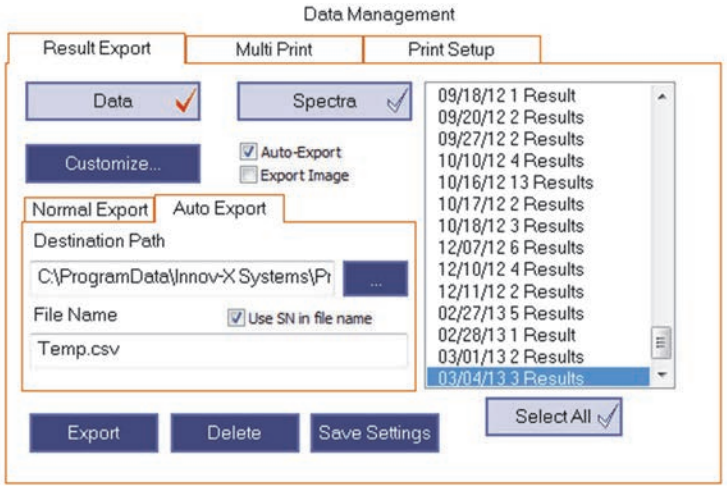


Figure 1-29 The Auto Export check box and tab selected

6. Click **Save Settings**.
   The next time you initiate a new test, the results will automatically be exported to the specified file.

To customize the export boxes

1. On the **Result Export** tab, click **Customize** to display the Customize pane (see Figure 1-30 on page 24).
2. Click the down arrow in the **Export Template** list and select a template name.

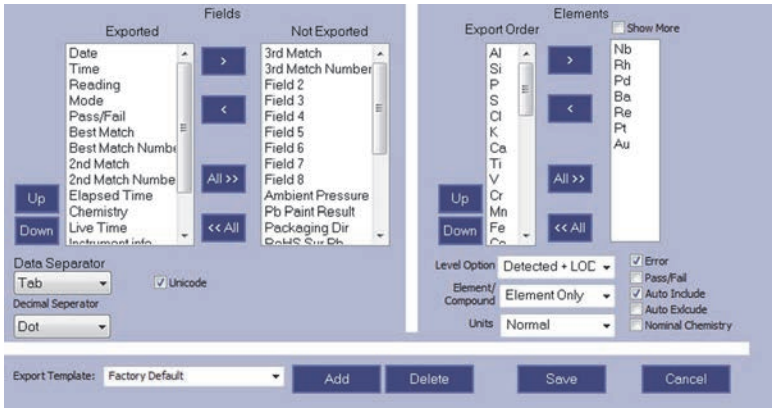


Figure 1-30 The Customize pane

3. In the **Fields** box, select parameters in the **Not Exported** list, and then click the left arrow ( ) to move them to the **Exported** list (see Figure 1-31 on page 25).
   Alternatively, move parameters from the **Exported** list to the **Not Exported** list using the right arrow ( ).
   Table 3 on page 25 lists the parameters that can be exported.
4. To move an item up or down in the **Exported** list, select the item and then click the **Up** or **Down** button.
5. In the **Data Separator** list, choose whether you want the exported data to be **Tab**, **Comma**, or **Semicolon** delimited.
6. In the **Decimal Separator** list, choose whether you want a decimal to be represented by a **Dot** or a **Comma**.
7. Select the **Unicode** check box to encode the exported text as Unicode (default selection). Clear the **Unicode** check box for international configurations.

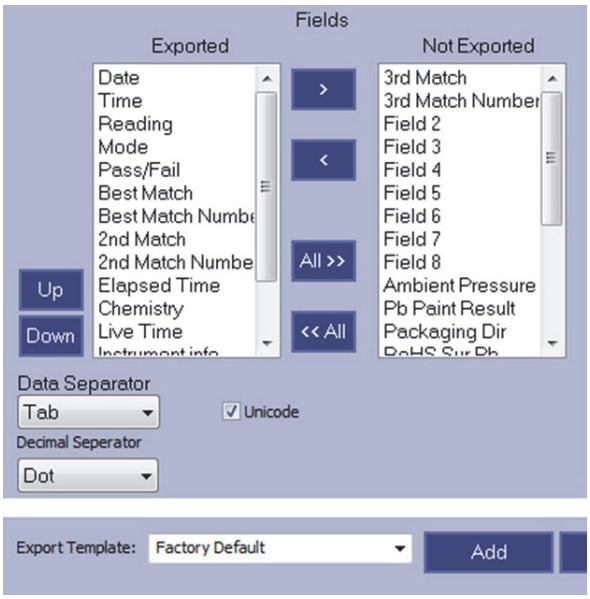


Figure 1-31 The Fields pane

Table 3 Default list of exportable parameters

Exportable Parameters
2nd Match
2nd Match Number
3rd Match
3rd Match Number
Ambient Pressure
Au Coating
Au Karat
Best Match
Best Match Number
Cal Check info
Chemistry
Collimated
Date
Elapsed Time
Field 1
Field 2
Field 3

Table 3 Default list of exportable parameters *(continued)*

Exportable Parameters
Field 4
Field 5
Field 6
Field 7
Field 8
Hal Free Sum
Instrument Info
Live Time
LOD Sigma
Method name
Mode
Pass/Fail
Packaging Dir
Pb Paint Result
Reading
RoHS Sur Pb
Time
Unit
User Factor Name

To select elemental data for export

1. In the **Elements** pane, select elements and move them from the box under **Show more** to the **Export Order** list using the left arrow(<). These are the elements that will be exported (see Figure 1-32 on page 27).
   - Move elements out of the **Exported Order** list using the right arrow (>).
   - Use the **All** buttons to move all the elements from one list to the other.
   - To show every possible element to export, select the **Show more** check box.
2. To move an item up or down in the **Export Order** list, select the item and then click **Up** or **Down**.

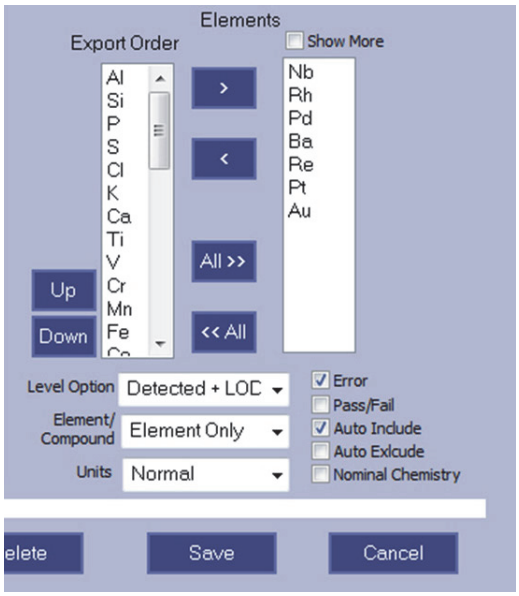


Figure 1-32 The Elements area

3. Select an option in the **Level Option** list:
   - **Detected**

     In the exported file, displays **ND** (non-detect) in the **Result** column for all non-detects, and leaves the +/- column blank.
   - **Detected + LOD**

     Displays < LOD in the result column and the estimated **LOD** (limit of detection) calculation in the +/- column.
   - **Chem < LOD**

     Displays a calculated result and error even when the result is less than the limit of detection for that particular analysis. This option is mainly for advanced users.
4. Select an item in the **Element/Compound** list:
   - **Element Only**
   - **Compound Only**
5. Select a unit of measure in the **Units** list:
   - **Normal**
   - **Percent**
   - **PPM**
   - **Mixed**
6. *Optional*: Choose from among the following:
   - Select the **Errors** check box to include error data.
   - Select the **Pass/Fail** check box to include pass/fail data.
   - Select the **Auto Include** check box to export nominal chemistry data, if it exists.
   - Select the **Auto Exclude** check box to ignore nominal chemistry data.
   - Select the **Nominal Chemistry** check box to always export nominal chemistry data.

To select an export template

- To choose a template, click the down arrow in the **Export Template** list and select the desired template in the list (see Figure 1-33 on page 28).

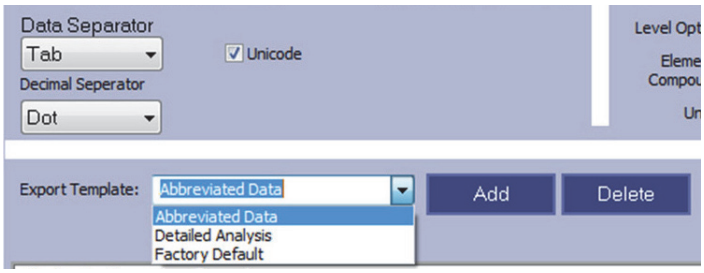


Figure 1-33 Selecting an export template

To add an export template

1. Click **Add** to open the **Add Export Template** dialog box (see Figure 1-34 on page 28).
2. Enter a template name.
3. Click **Ok**.

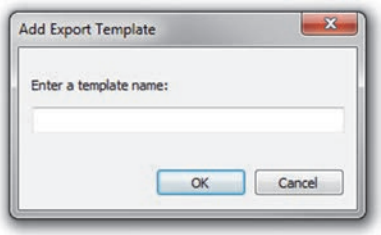


Figure 1-34 The Add Export Template dialog box

To delete an export template

1. Select a template in the **Export Template** list, and then click **Delete** (see Figure 1-33 on page 28).
2. Click **OK** in the dialog box.

To save the customized results data

- Click **Save** to save your selections and return to the **Data Management** pane.

1.6.2 Print Setup Tab

The **Print Setup** tab allows you to configure the information that appears in printed reports.

To configure the Print Setup tab

1. Click the **Print Setup** tab (see Figure 1-35 on page 29).

2. To turn a print field on or off, click the corresponding button. The field is on when the check mark on the button is red, and off when the check mark is white. The available print field buttons are listed below:
   - **Title**
   - **Logo**
   - **Result**
   - **Signature**
   - **Test Information**
   - **Spectrum**
   - **Image**

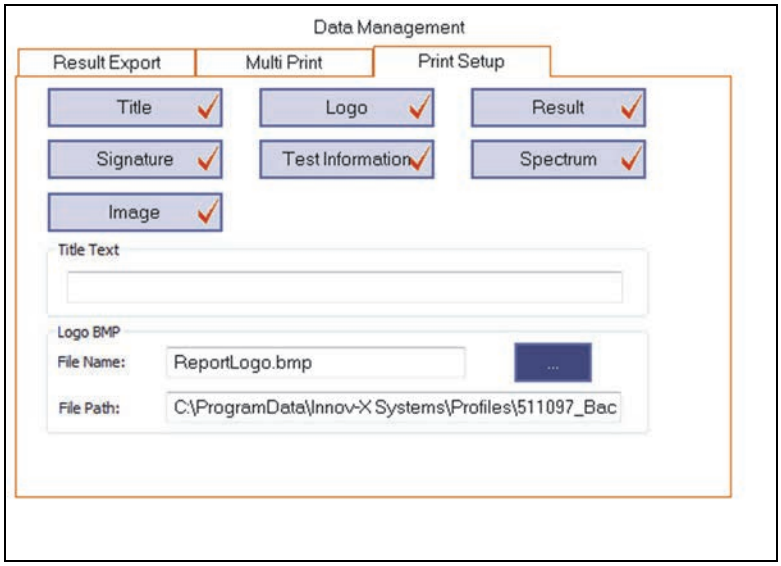


Figure 1-35 The Print Setup tab

When the **Title** button is active, the **Title Text** box displays on the tab.

3. Type new text in the **Title Text** box to change the report title.

When the **Logo** button is active, the **Logo BMP** box displays on the tab.

4. To change the logo, change the file name and file path:

   a) Click the ellipsis button (...) next to the **File Name** box.

   b) Select the alternate logo file in the dialog box, and then click **Open**.

   The new file name appears in the **File Name** box and the path is displayed in the **File Path** box.

1.6.3 Multi Print Tab

The **Multi Print** tab allows you to select results sets for inclusion in a printed report.

To select results sets for inclusion in reports

1. Click the **Multi Print** tab (see Figure 1-36 on page 30).
2. Select one or more results sets.

Click **Select All** to select all the results sets.

3. Click **Print** to begin printing on your default printer.

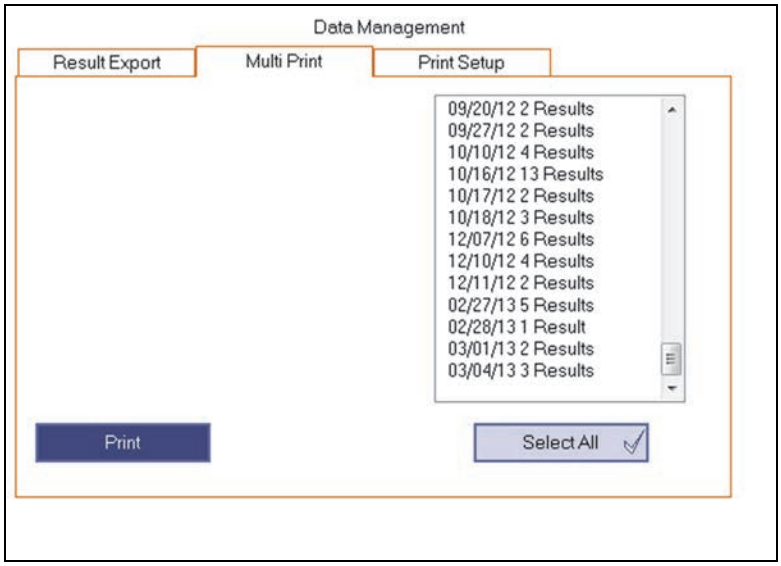


Figure 1-36 The Multi Print tab

1.7 Factory Settings — Hardware/Misc Settings

The Factory Settings function allows you to enable or disable selected features of the DELTA analyzer. There are ten buttons on the **Factory Settings** pane. The only button you should use is **Hardware/Misc Settings**.

IMPORTANT

Changing parameters in the **Factory Settings** pane could render your DELTA analyzer inoperable. Only use the **Hardware/Misc Settings** as described below.

The **Misc Settings** box contains miscellaneous parameters that are intended to be configured by users.

To select the Misc Settings

1. Click the **Factory Settings** icon () to display the **Factory Settings** pane.
2. Click **Hardware/Misc Settings** to display the **Hardware/Misc Settings** pane (see Figure 1-37 on page 31).

   You will be making changes in the **Misc Settings** area only.
3. *Optional*: Select from the following settings:
   - To enable Au karating in Alloy mode, select the **Enable Au Karat** check box.
   - To require an entry in a test info field before a test is run, select the **Enable Force Test Info** check box.

- To enable test label editing, select the **Test Label Edit** (Post Test) check box.
- To enable surface Pb parameters in ROHS mode, select the **Enable ROHS Surface Pb** check box.
- To enable live averaging, select the **Live Averaging** check box.
- To enable historical averaging in test results, select the **Historical Averaging** check box.

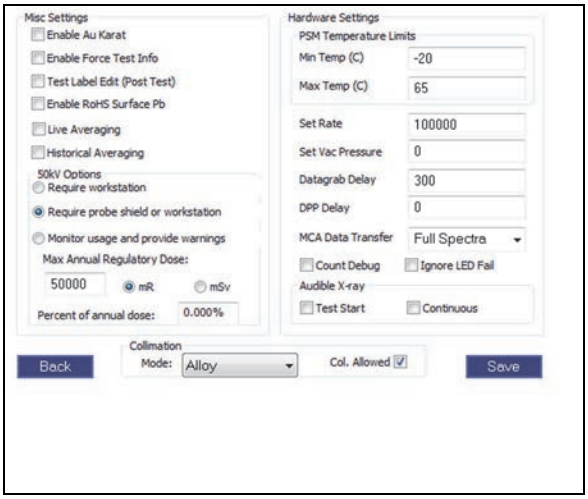


Figure 1-37 The Hardware/Misc Settings pane

4. Click **Save** to save your changes and return to the **Factory Settings** pane.

1.8 Search Filter

The Search Filter filters the results available on the **View Data** window. You can filter by mode, date range, test info fields, and elemental criteria.

◆ Click the **Search Filter** icon () to display the **Search Filter** pane (seeFigure 1-38 on page 32).

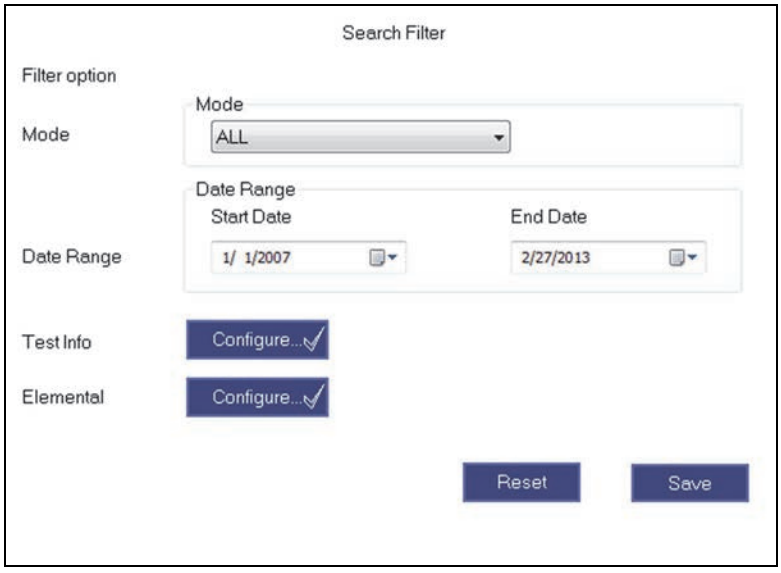


Figure 1-38 The Search Filter pane

To filter by mode

1. Click the **Mode** list and select a mode.
   Select **ALL** to include all modes.
2. Click **Save**.

To change the start date or end date

1. In the **Date Range** area, click the day, month, or year in the **Start Date** or **End Date** boxes and change the value.
   You cannot change values beyond the range of recorded results.
2. Click **Save**.

To filter by test info field

1. Click the **Configure** button beside the **Test Info** filter option to display the **Test Info Search Filter** pane (see Figure 1-39 on page 33).
2. In the **Search Criteria** box for the selected **Test Info Field** (1-8), enter the information to search on for that field.
3. Click **Save** to save your changes.

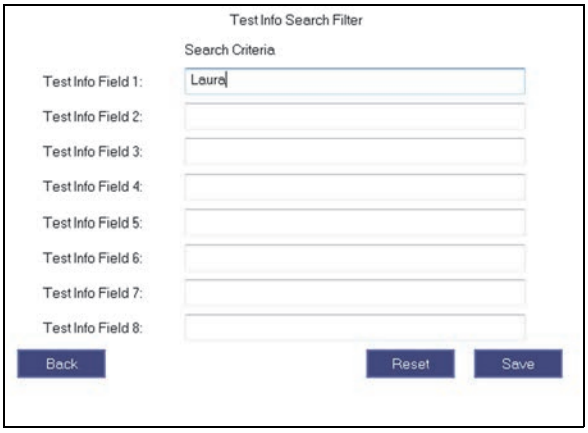


Figure 1-39 The Test Info Search Filter pane

To filter by elemental information

1. Click the **Configure** button beside the **Elemental** filter option to display the **Elemental Search Filter** pane (see Figure 1-40 on page 33).
2. In the **Element** box, enter an element symbol.
3. In the **Minimum** and **Maximum** boxes, enter a value.
4. The value represents percentage for Alloy mode, parts per million (PPM) for Soil mode.
5. Click **Save**.

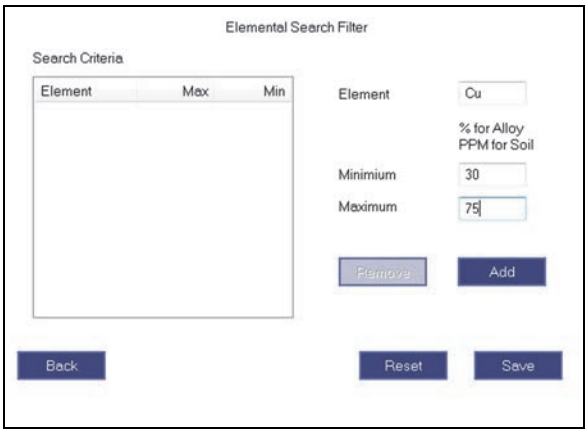


Figure 1-40 The Elemental Search Filter pane

1.9 User Management

DELTA users can be assigned one of three levels of system privileges - user, administrator, and factory.

- User level privilege holders can view and change options and parameters, but cannot make any changes in the **Factory Settings** pane.

- Administrator level privilege holders can view and change options and parameters, including adding, editing or deleting user level accounts, but cannot make any changes in the **Factory Settings** pane.
- Factory level privilege holders can view and change all options and parameters, including all of the Factory Settings.

On the **User Management** pane:

- A User account holder is only allowed to change their password (**Edit User** button).
- Two default accounts exist that cannot be deleted:
  - **admi** is an **Admin** level account (**Password = 1234**).
  - **innovx** is a **Factory** level account (**Password = 1776**).
- The Admin account holder cannot add, edit, or delete any user account on the Factory access level, but can add, edit, or delete any user account on the User access level.
- The Factory account holder can add, edit, or delete any user account on any access level.
- No account holder can delete their own account.

To access the User Management pane

◆ Click the **User Management** icon ( ).

To change a password

1. Click **Edit User** to display the **Edit User** pane (see Figure 1-41 on page 34).
2. In the **Password** field, enter a password.
3. In the **Confirm Password** field, enter the password again.
4. Click **Save** to save and return to the **User Management** pane.

Figure 1-41 The Edit User pane – Change password

To set user privileges

1. Click **Edit User** to display the **Edit User** pane (see Figure 1-42 on page 35).
2. In the **User Group** list, select a user group access level.
3. Click **Save** to save and return to the **User Management** pane.

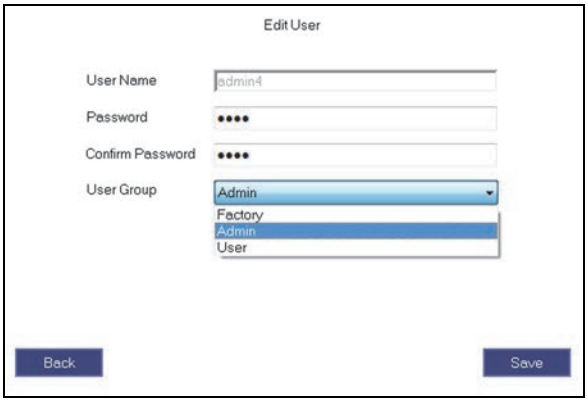


Figure 1-42 The Edit User pane – Change user group

To add a user

1. Click **Add User** to display the **Add User** pane (see Figure 1-43 on page 35).
2. In the **User Name** box, enter a user name.
3. In the **Password** box, enter a password.
4. In the **Confirm Password** box, enter the password again.
5. In the **User Group** list, select a user group access level.
6. Click **Save** to save and return to the **User Managemen**t pane.

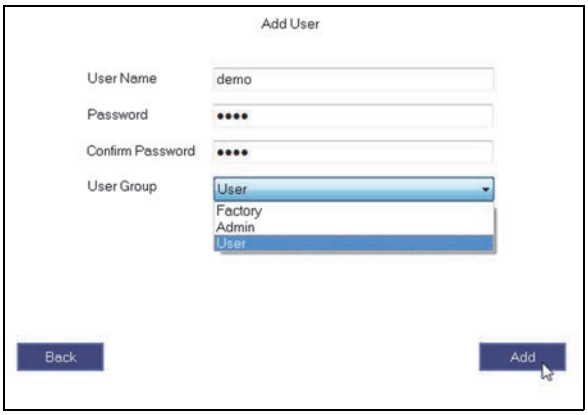


Figure 1-43 The Add User pane

To delete a user

1. On the **User Management** pane, select the user that you wish to delete.
2. Click **Delete User** (see Figure 1-44 on page 36).
   The user is immediately deleted. No confirmation dialog box is displayed.

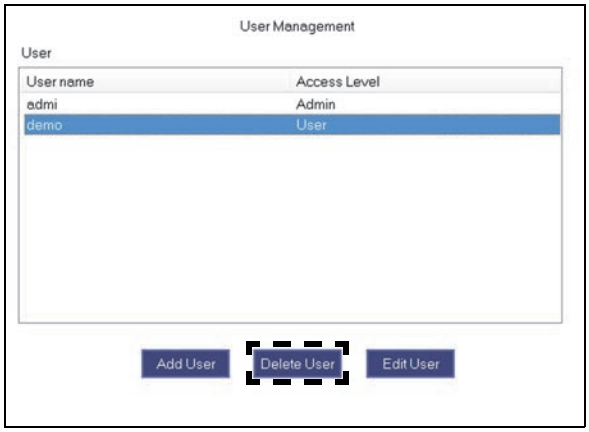


Figure 1-44 The User Management pane – Delete User button

1.10 Customize Display

Customize Display sets the display parameters and pane behavior for the selected mode.

To access Customize Display

- Click the **Customize Display** icon ( ) to display the **Customize Display** pane (see Figure 1-45 on page 36).

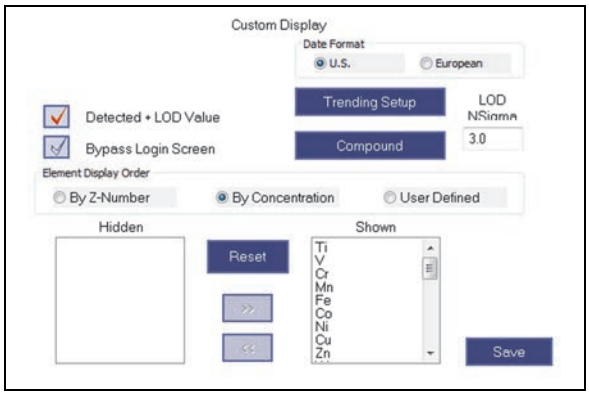


Figure 1-45 The Customize Display pane

1.10.1 Selecting the Common Custom Display Options

There are three variations of the **Customize Display** pane depending on the mode (see Figure 1-45 on page 36):

- Mining and Mining Plus
- Soil and ROHS/WEEE
- Alloy and Alloy Plus

To select the common Custom Display options

1. Select a date format of **U.S.** or **European** (see Figure 1-46 on page 37).
2. Select the **Detected + LOD Value** check box to see a detected value and the limit of detection value for non detected elements.
3. Select **Bypass Login Screen** to bypass the login screen and start with user privileges the next time the DELTA PC Software is started from the profile manager. See "User Management" on page 33 for more information.
4. Click the **LOD NSigma** box and enter a value to set the detection parameter.

   The NSigma value gives the "statistical confidence" for detection. An NSigma value of 3.0 is typical for most applications. Ensure that an NSigma value of 3.0 is acceptable for your testing requirements.

   An NSigma value of 0 will show all elements as detected and will report the calculated result and uncertainty (+/-) for all elements. No elements will be shown as "<LOD." This option is normally used only in advanced applications, and is not available in Alloy or Lead Paint modes.

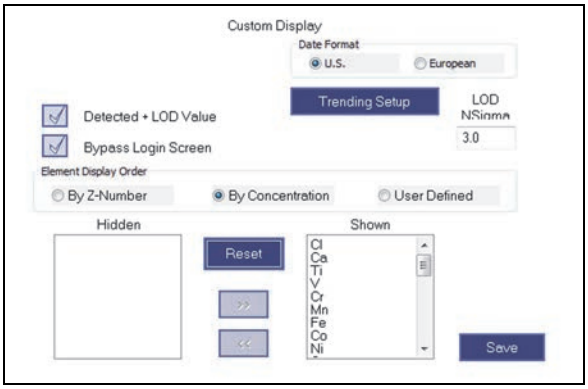


Figure 1-46 The Custom Display pane

Additional check boxes for Alloy modes

- Select **Show Alloy Grade Comp** to have Analysis or View Data screens indicate matched alloy grades and match numbers.
- Select **Show Nominal Chemistry** to have Analysis or View Data screens list the elements that are inferred as included in a test, based on a grade match.

To set the Element Display Order according to the atomic number

◆ Select **By Z-Number**.

To set the Element Display Order according to the test sample concentration

◆ Select **By Concentration**.

To define a new display order

1. Select **User Defined** (see Figure 1-47 on page 38).

2. Select an element and click the left or right arrow(<< / >>) to move the element between the **Hidden** and **Shown** lists.
3. Click the up or down arrow (∧ / ∨) to change the order of an element in the **Shown** list.
4. Click **Reset** to move all the elements back to the **Shown** list in their original order.
5. Click **OK**.

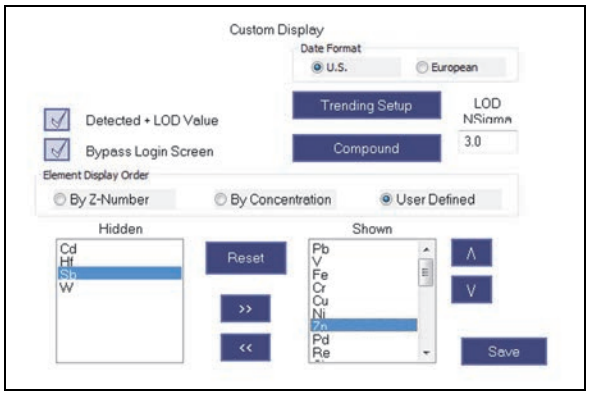


Figure 1-47 Defining a new display order

1.10.2 Compound Button for Mining Modes

To configure compounds

1. In the **Custom Display** pane, click the **Compound** button to display the Compound pane (see Figure 1-48 on page 38).
2. Select the **Enable Compound Display** check box to display the compounds in the Analysis window and exported results.
3. Select the **Suppress sum > 100% msg (Reset on restart)** check box to prevent the "Caution: Sum >100%" message from being displayed in the Test and Results screens.

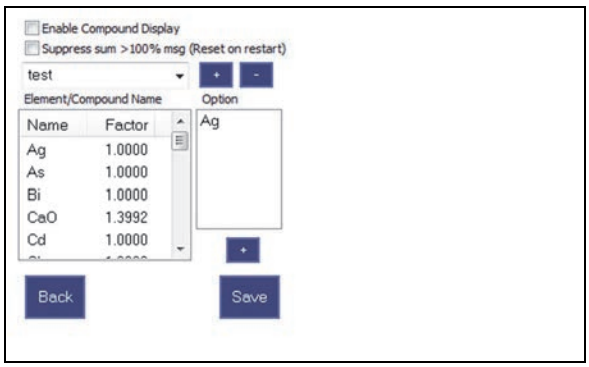


Figure 1-48 The Compound pane

4. Click the plus (+) button beside the Default list to display the **Add Compound Template** dialog box (see Figure 1-49 on page 39).

5. Under **Enter a template name**, type a template name in the text box, and then click **OK**.

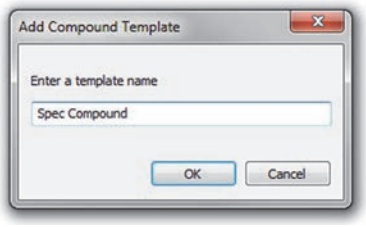


Figure 1-49 The Add Compound Template dialog box

6. In the Compound pane, click the down arrow and select the new template (see Figure 1-50 on page 39).
7. Select an **Element/Compound Name**.

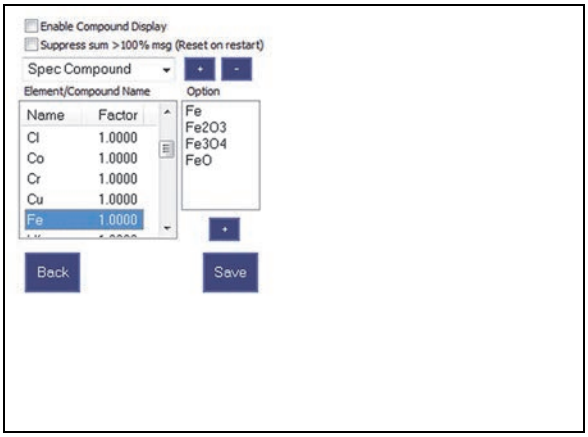


Figure 1-50 Adding a compound

8. Click the plus button under the **Option** list to display the **Add Compound** dialog box (see Figure 1-51 on page 39).

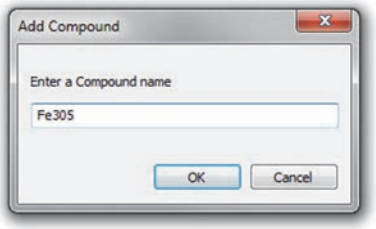


Figure 1-51 The Add Compound dialog box

9. Add a compound of the same type selected in the previous pane.
   Representative acceptable compound names (forms) are Fe_3O_2 or $Fe_2(OH)_2$. The compound calculation factor (using $Fe_2(OH)_2$ as an example) is based on:

[the total atomic weight for $Fe_2(OH)_2$] ÷ [the total atomic weight for Fe_2].

In Figure 1-52 on page 40, the newly added compound shows up in the **Element/Compound Name** list. (The new compound is also listed in the Test window after running a test.)

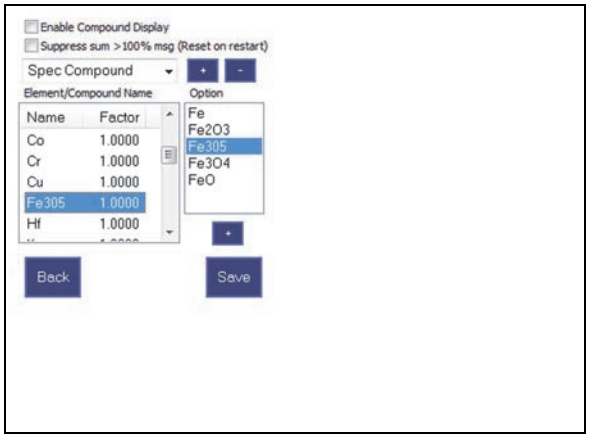


Figure 1-52 The new compound in the Element/Compound Name list

1.10.3 Trending Setup

Trending allows you to compare and display the analytical accuracy of individual elements across multiple test results.

To set up basic trending

1. On the **Custom Display** pane, click **Trending Setup** to display the **Trending** pane (see Figure 1-53 on page 40).

   If no template is defined, trending is disabled, and "**Trending Disabled**" is displayed.

2. To define a new template name, click the add button (+) to display the **Add Trending Template** dialog box (see Figure 1-54 on page 41).

Figure 1-53 The Trending pane

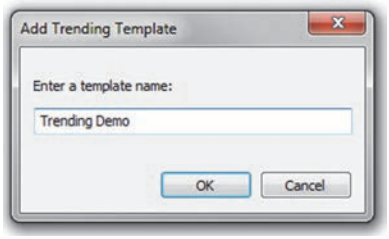


Figure 1-54 The Add Trending Template dialog box

3. Type a template name, and then click **OK** to save and display the new template (see Figure 1-55 on page 41).

   In the **Trending** pane, the current template name is displayed in the list at the top of the pane.

   You can define new templates or delete the currently selected template using the plus and minus buttons.
4. Under **Graph Option**, choose **Test Numbe**r, or **Test Label**.

   This information will be used as the x-axis of the trending graph.
5. Select elements and move them between the **Excluded** and **Included** lists using the arrows.

   The elements in the **Included** box are used when the trending graph is displayed.

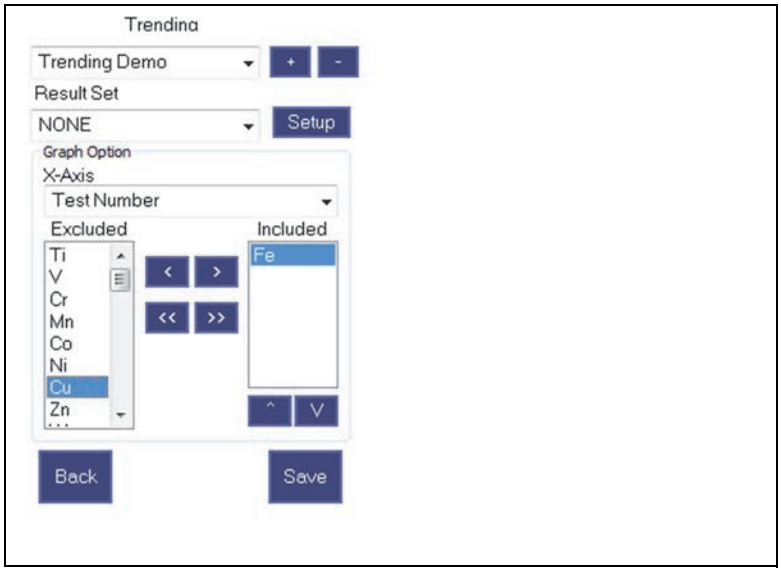


Figure 1-55 The Trending pane with the template defined

To configure a Trending Filter

It is not necessary to configure trending filters. However, if filters are not configured, the trending graph will contain results for all modes and all dates that are currently on the analyzer. To provide more specific graphs, it is best to define filters that use a single mode, one or more test labels, or specific dates.

1. To add a **Result Set** filter, click **Setup** (refer to Figure 1-55 on page 41) to display the **Trending Filter** pane (see Figure 1-56 on page 42).

   The **Result Set** filter list shows the current filter. If no filters are selected, **NONE** is displayed.

2. Click the add button (+) to display the **Add Trending Filter** dialog box.
3. Enter the filter name, and then click **Save** to display the **Trending Filter** pane.

   The current filter name is displayed at the top of the pane.

   You can define new filters using the add button, or delete the currently selected filter using the delete button (-).
4. In the **Mode** list, click the down arrow and select a mode.

   Each of the two lists below the **Mode** box allow you to configure one of the eight test labels. These are not normally used, but can be configured to provide more granular filtering. If test labels are used, you must enter the value of the selected label in the adjacent box. Note that the test labels must first be defined in the **Test Label Setup** pane (see "Results Test Info" on page 11).
5. To set a date range for the trending graph, click the down arrow in one or both of the From and To boxes, and enter a date using the calendar.

   You can quickly select a year by clicking on the year (at the top of the calendar). Continue clicking to broaden the range of months, and then years. Select a year, then a month, and finally, a day (see Figure 1-56 on page 42).

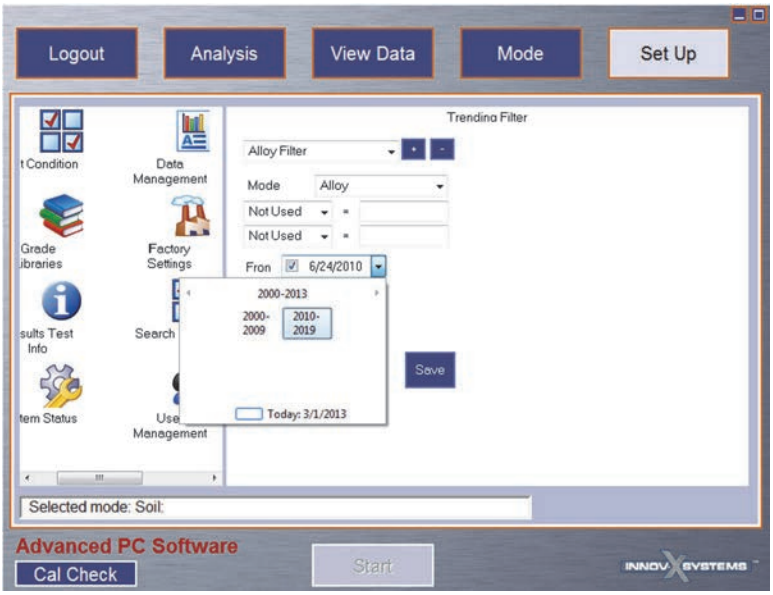


Figure 1-56 Date selection in the Trending Filter pane

NOTE

When the date filter is set, all tests run during that date range are included in the trending analysis. You cannot include or exclude any particular test results for a given date range.

6. Click **Save** to return to the **Trending** pane (see Figure 1-57 on page 43).

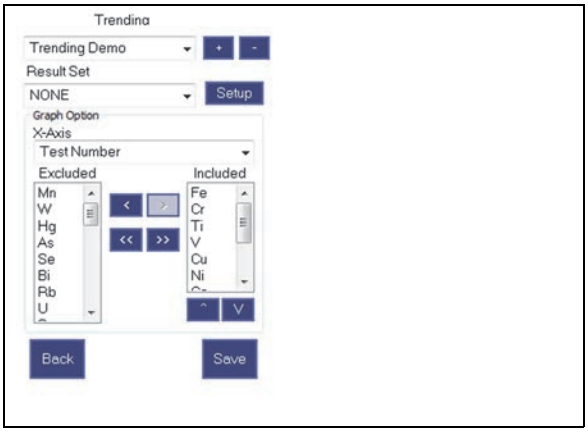


Figure 1-57 The Trending pane – template setup

7. Click **Save** again to return to the **View Data** window.
   For more information on trending, see "Trending Example" on page 123.

2. Alloy, Alloy Plus, and Precious Metals Test Conditions

Alloy, Alloy Plus, and Precious Metals modes are similar, though the end-user objectives are different, and the modes use a different number of X-ray beams. Alloy Plus mode uses two beams, and its second beam is able to detect lighter elements such as magnesium (Mg) and aluminum (Al). Alloy mode also uses two beams, though its second beam is used to improve precision for titanium (Ti) and vanadium (V) measurements. Precious Metals mode uses one beam.

Alloy mode setup involves setting test conditions such as test time parameters, smart beam and grade matching options. Settings are accessed from the **Test Condition** pane (see Figure 2-1 on page 45).

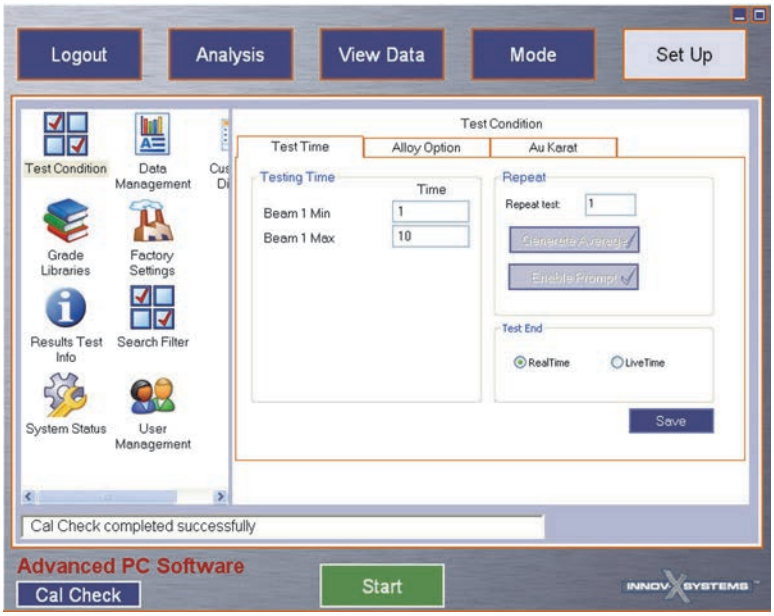


Figure 2-1 The Test Condition pane

When the DELTA analyzer is in an alloy analysis mode, it calculates elemental chemistry from the spectral data. The analyzer then compares chemical composition values to its integrated Factory Grade library grade tables, and generates grade ID and chemistry values in as little as one second.

The Precious Metals mode includes a Plate Alert feature that alerts you to the possibility that the object being analyzed is gold-plated. Plate Alert works by analyzing spectra to determine whether or not the object has a thin coating or plating of gold. If the analysis is affirmative, the message, **Gold Coating Possible - Investigate** is displayed with the test results. Also, if

gold content is detected, but measures less than 8 karat, the plate alert message is displayed. If no Plate Alert warning is displayed, it means that there is not enough information to conclude if the sample has a gold coating or is solid.

2.1 Test Time

To configure test time

1. Click **Mode**, and then select the appropriate alloy mode.
2. Click **Setup > Test Condition** to display the **Test Condition** pane (see Figure 2-1 on page 45).
3. On the **Test Condition** pane, select the **Test Time** tab.
4. Under **Testing Time**, enter minimum and maximum test times for each available beam (see Figure 2-2 on page 47):
   - **Min** is the minimum testing time before test results are actually calculated and displayed. This value can be set to zero.
   - **Max** is the total length of time a test runs. If the time is configured too short, the test can fail or imprecisely calculate results.
5. Under **Repeat**, enter repeat test variables as needed (see Figure 2-2 on page 47), including:
   - The number of times you want to repeat the test;
   - Whether to display a confirmation prompt before each test; and,
   - Whether to generate an average of all tests in a test set.

NOTE

If the **Generate Avg** check box is selected, spectrum results (plots) are NOT available for the average result.

---

6. Under **Test End**, select **RealTime** or **LiveTime** (see Figure 2-2 on page 47).
   - **RealTime** is the total interval that the analysis takes when measured on a standard clock. This is the most commonly selected option.
   - **LiveTime** is the interval in which the detector of the analyzer actually collects data. Since the analyzer does not always collect data throughout a measurement, **LiveTime** is less than the **RealTime** interval. **LiveTime** is selected primarily for laboratory calibration applications that require precise and repeatable results.
7. Click **Save** to save your changes.

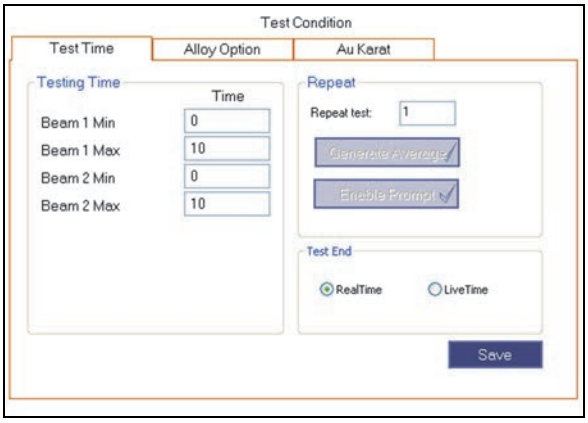


Figure 2-2 The Test Time tab

2.2 Alloy Options

The Alloy Option tab includes these parameters: Smart Beam Option, Al Mode, and Grade Matching. With Smart Beam enabled, the analyzer starts testing using standard beam conditions, then, if appropriate, automatically switches to a second beam. Al Mode toggles Aluminium mode or off. Grade Matching sets cutoff and nSigma values, and allows you to edit grades.

To set Alloy mode options

1. Click **Mode** and select the appropriate alloy mode.
2. Click **Setup > Test Condition** to display the **Test Condition** pane (see Figure 2-1 on page 45).
3. On the **Test Conditions** pane, select the **Alloy Option** tab (see Figure 2-3 on page 48).
4. Under **Smart Beam Option**, select a Smart Beam option:
   - **No Smart Beam** — The DELTA will never switch to beam two. This option is not commonly used.
   - **QuickSort** — If a sample is found to match two alloys that differ only by a small amount of Ti or V, the DELTA switches to a second beam. Beam 2 is used until the maximum testing time for beam two has elapsed. When the DELTA switches to the second beam, the names of the two alloys being separated appear.

     If the alloy has a unique ID or if the best matches differ by something other than a small amount of Ti or V, the analyzer functions as it does with Smart Beam deactivated.
   - **Precision** — The Smart Beam Option pane automatically switches to the second beam after the set time for the first beam. The second beam is active for the time specified in the test time pane. At completion, a final result reflecting information from both beam settings appears. This option provides better precision on Ti and V results, if they are present in the alloy.
5. Under **Al Mode**, select **On** or **Off** to enable or disable Aluminum mode.

NOTE

Al mode toggles light element (LE) detection in Alloy mode. Enabling Al mode is similar to using the Alloy Plus mode **Single Beam - With LE detection** option (see section "Alloy Plus Options" on page 48). Turn Al mode off when using a weld mask.

6. Under **Grade Matching**, edit the **Match Cutoff** and **nSigma** parameters. See "Grade Libraries" on page 51 for more information.

NOTE

Sorting professionals have suggested a **Match Cutoff** setting of 5, and an **nSigma** setting of 2. The most frequently used **nSigma** setting is between 0 and 2.

For scrap sorting, an **nSigma** setting of 0 or 1 is most common. For positive material identification (PMI) applications, an **nSigma** setting of 1 or 2 is most common.

7. Click **Edit Grades** to edit grade libraries. See "Grade Libraries" on page 51 for more information.
8. Click **Save** to save your changes.

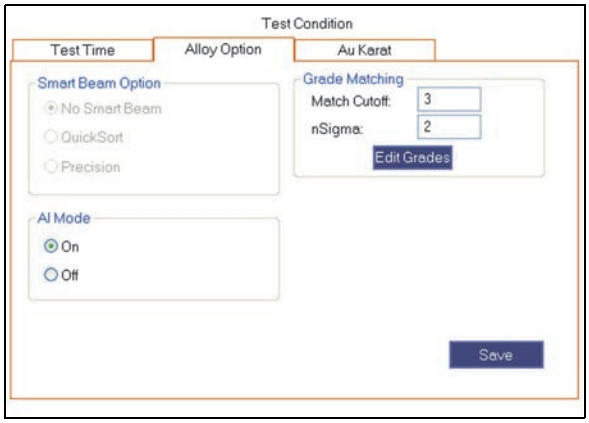


Figure 2-3 The Alloy Option tab

2.3 Alloy Plus Options

The Alloy Plus options are found only when in the Alloy Plus mode. A DELTA analyzer with Alloy Plus mode enabled is a two beam instrument.

About the SmartSort function

The SmartSort function promotes automated sorting decisions that allow you to maximize speed and sorting accuracy. When the SmartSort function is enabled, Alloy Plus will switch to the second beam if it is necessary to provide a conclusive grade match. Some features include:

- Short test times (approximately three seconds) for most grades.

- Specific grades set up to automatically extend testing time for proper analysis.
- Maximum speed testing efficiency by automatically extending test time for light elements (Mg, Al, Si, P, S). This eliminates unnecessary long tests.

To set Alloy Plus mode options

1. Click **Setup > Test Condition** to display the **Test Condition** pane (see Figure 2-1 on page 45).
2. On the **Test Conditions** pane, select the **Alloy Option** tab (see Figure 2-4 on page 50).
3. Under **Alloy Plus Options**, select an option (**SmartSort** is the default):
   - **Single Beam - Suppress LE** detection

     This option will test for elements Ti (Atomic Number 22) and higher. It is not possible to match aluminum-based alloy grades with this option. Select this option when using a weld mask.
   - **Single Beam - With LE detection**

     This option will test for elements Ti (atomic number 22) and higher. This option detects aluminum (Al) and other light elements indirectly during the beam 1 test and reports them as LE.
   - **Two Beams Always (Al, Si, Mg, S, P)**

     Two beam operation is always enabled. Select this option to get information about lighter elements (Mg, Al, Si, P, S). For many grade separations this option generates unwanted excess data.
   - **SmartSort**

     Uses a second beam when needed as determined by the analyzer. Use this option to detect lighter elements (Mg, Al, Si, P, S) without creating unwanted data.
4. Under **Beam 2 Condition**, select a beam 2 condition:
   - 13 kV
   - 8 kV
   - SmartSelection (analyzer determines beam 2 condition)
5. Under **Grade Matching**, edit **Match Cutoff** and **nSigma** parameters. See “Grade Libraries” on page 51 for more information.

NOTE

Sorting professionals have suggested a **Match Cutoff** setting of 5, and an **nSigma** setting of 2. The most frequently used **nSigma** setting is between 0 and 2.

For scrap sorting, an **nSigma** setting of 0 or 1 is most common. For positive material identification (PMI) applications, an **nSigma** setting of 1 or 2 is most common.

---

6. Click **Edit Grades** to edit grade libraries. See “Grade Libraries” on page 51 for more information.
7. Click **Save** to save your changes.

Figure 2-4 The Alloy Plus Options tab

2.4 Au Karating

You can enable the Au Karating function using the **Au Karating** parameter. If detected, gold will be reported in karat value, as well as percent.

To configure Au karating

1. Click **Setup > Test Condition** to display the **Test Condition** pane (see Figure 2-1 on page 45).
2. On the **Test Conditions** pane, click the **Au Karat** tab (see Figure 2-5 on page 50).

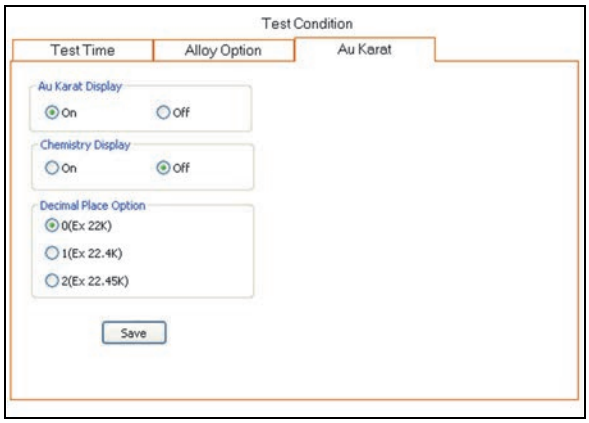


Figure 2-5 The Au Karat tab

3. Under **Au Karat**, select **On** or **Off**.
4. Under **Chemistry Display**, select **On** or **Off**.
5. Under **Decimal Place Option**, select an option.
6. Click **Save** to save your changes.

2.5 Grade Libraries

The **Grade Libraries** are available only in the Alloy and Alloy Plus modes.

You can edit all libraries, including the Factory Grade library. However, Olympus does not recommend that you edit the Factory Grade library. Instead, Olympus suggests that you copy the Factory Grade library to a user library, then make any edits on the newly created user library.

There are four segments to the library manager:

- **Match Settings**
- **Load Library**
- **Edit Library**
- **Pass-Fail / Select Grade**

To edit Grade Libraries

- Click **Setup > Grade Libraries** to display the **Grade Libraries** pane (see Figure 2-6 on page 51.

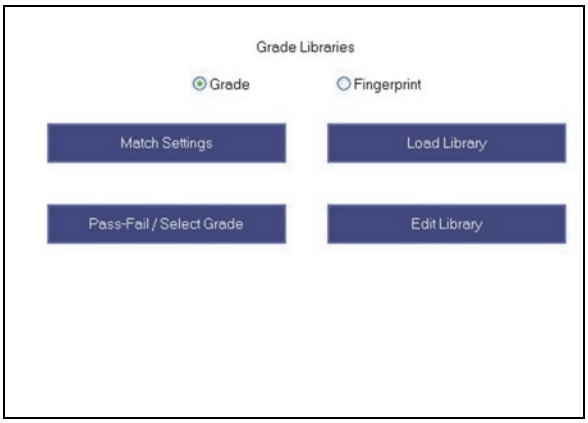


Figure 2-6 The Grade Libraries pane

2.5.1 Configuring Match Settings

After calculating chemistry, the DELTA compares the chemical composition values to grade tables in a grade library. The value for a parameter called “match number” is then calculated. The match number indicates how close the measured alloy chemistry is to the library specification. The lower the match number (MN), the better the match:

- MN equalling 0 indicates an **exact** match.
- MN less than 1 indicates a **good** match.
- MN between 1 and 2 is an **okay** match.
- MN between 2 and 3 is a **fair** match.
- MN greater than 3 is a **poor** match.

There are three match determination possibilities provided within the Alloy modes.

- Exact match or good match

  An exact match or good match means that the calculated chemistry for all elements falls within the grade table specifications. A Grade ID is displayed on the **View Data** window. Often other grades are listed with their accompanying match numbers. The elemental chemistries of those grades can be viewed to see how they differ from an exact match.

- Multiple matches

  In some cases, several grades are shown as possible matches. This can signify one of three conditions:

  — There was not enough statistical information to definitively separate two or more alloys. The actual identification of the unknown alloy is one of the grades listed. Often, increasing the testing time makes it possible to separate the alloys.

  — There was sufficient statistical information, but the test sample did not meet any of the existing specifications with enough precision to cause an exact match identification.

  — In rare cases, grade specifications may overlap, meaning that a single sample can meet the specification of two or more alloys. In this case, it is possible to see an exact match to multiple alloys, and increasing test time will not separate the matches.

- No match

  There are several causes for a “no match” result:

  — The test sample does not meet any of the specifications in the grade library.

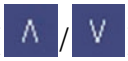
  — The test sample is coated.

  — The testing time was too short.

  — The match number is too low.

There may be occasions when valid matches fail to register as exact. This could happen because of measurement uncertainties or the presence of tramp elements. The **Match Settings** pane allows you to change the **Match Cutoff** and **nSigma** parameters to correct for measurement uncertainties or the presence of tramp elements.

To configure the match settings

1. In the **Grade Libraries** pane, click **Match Settings** (see Figure 2-7 on page 53).
2. Under **Grade Match Parameters**, click the up or down arrow () to select a **Match Cutoff** value.
3. Click the up or down arrows () to select the **nSigma** value.

   Sorting professionals have suggested a **Match Cutoff** setting of 5, and an **nSigma** setting of 2. The most frequently used **nSigma** setting is between 0 and 2:

   - For scrap sorting, an **nSigma** setting of 0 or 1 is most common.
   - For positive material identification (PMI) applications, an **nSigma** setting of 1 or 2 is most common.
4. Click any of the following buttons:
   - **Enable grade match POPUP msgs**
   - **Enable Beep on grade match**
   - **Enable grade match messages**
5. Click **Save** to save your changes.

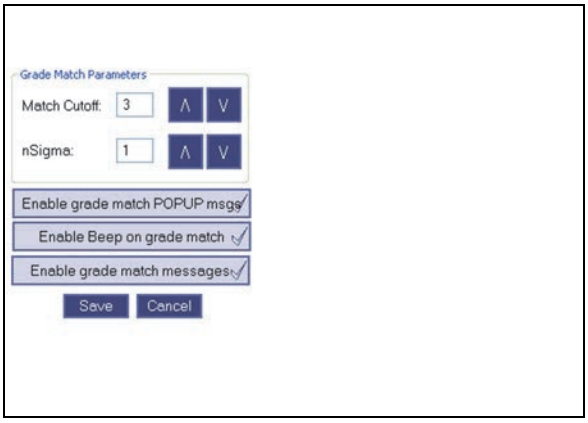


Figure 2-7 The Grade Match Parameters pane

Calculations using nSigma and Match Cutoff values

The analyzer calculates match settings using the **nSigma** and **Match Cutoff** values.

- **nSigma** —The analyzer collects measurements and the **nSigma** value is used to calculate the amount of tolerable variation, relative to the target value. This approximate range is configured using the min/max values in the Grade library for each element.

  The nSigma parameter factors in the precision of the measurement when matching the measurement against a grade specification:

  — When **nSigma** is set to zero the analyzer ignores the precision of the measurement and uses only the measured value when comparing the measurement to the grade specification in the Grade library.

  — A setting of 1, 2, or 3 equates to a factor of 1, 2, or 3 times the precision (±) of each measurement. This occurs when the analyzer is comparing the measurement to the grade specification in the Grade library.
- **Match Cutoff** — Once the measured calculations are analyzed relative to the **nSigma** value, the match number is calculated and compared to the user-configured match number.

Typically, the analyzer searches for exact or nearest matches:

- Exact matches
  — The analyzer calculates chemistries using the fundamental parameters algorithm and searches the **Grade Libraries**.
  — All chemistry values must be within a user-definable error band of the min/max values specified in the **Grade Libraries**.
- Nearest Matches — When searching for a nearest match the analyzer:
  — Calculates chemistries using the fundamental parameters algorithm and searches the **Grade Libraries**;
  — Determines which alloy(s) is (are) the closest match to the calculated results; and,
  — Determines whether a grade is considered a match by comparing the calculated match number for that alloy to a cutoff value (typically set at 3).

  The cutoff value supports a wide range of alloys. The cutoff value can be modified, but as a general rule, it should not be changed.

2.5.2 Loading Grade Libraries

The **Load Library** pane allows you to select the libraries that are referenced during testing.

NOTE

For a listing of the Alloy grades contained in the Factory library and Tramp library, see "Alloy Grade Libraries" on page 137. (Library listings may be incomplete, as grades are continually being added.)

To load the Grade Libraries

1. In the **Grade Libraries** pane, click **Load Library** (see Figure 2-8 on page 54).
2. In the **Load Grade Libraries** area, select one of the following options (see Figure 2-8 on page 54):
   - **All** — loads all libraries.
   - **Factory Library Only** — loads only the Factory library (supplied by Olympus).
   - **User-defined** — loads selected libraries, which can include
     - — Factory {model} library (contains over 400 grades). Factory libraries are correlated to the instrument model
     - — Tramp library, (containing seven alloy bases — supplied by Olympus).
     - — Up to two User libraries (each capable of holding over 500 grades)
3. If you select **User-defined**, also select the appropriate button(s).
4. Click **Save** to save your changes.

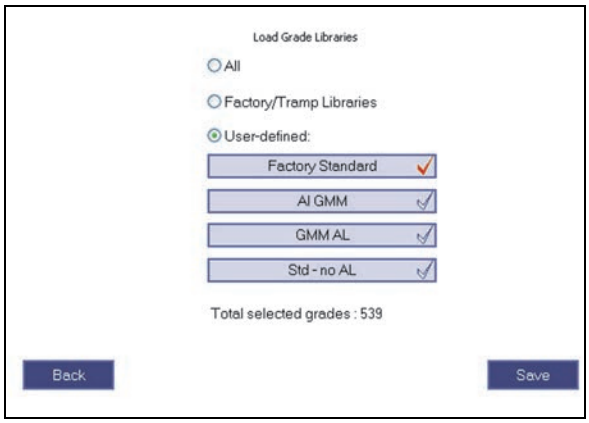


Figure 2-8 The Load Grade Libraries pane

2.5.3 Editing Grade Libraries

The **Edit Library** pane contains several configuration options that can be applied to DELTA libraries. Grades can be added to any library and existing grades can be edited. Also, the two user-defined libraries can be renamed.

NOTE

You can edit all grade libraries. However, Olympus does not recommend that you edit the Factory Grade library.

To select a grade for editing

1. In the **Grade Libraries** pane, click **Edit Library** (see Figure 2-9 on page 55).
2. In the **Edit Grade Libraries** area, select a grade library, and then click **Edit Existing Grades** (see Figure 2-9 on page 55).

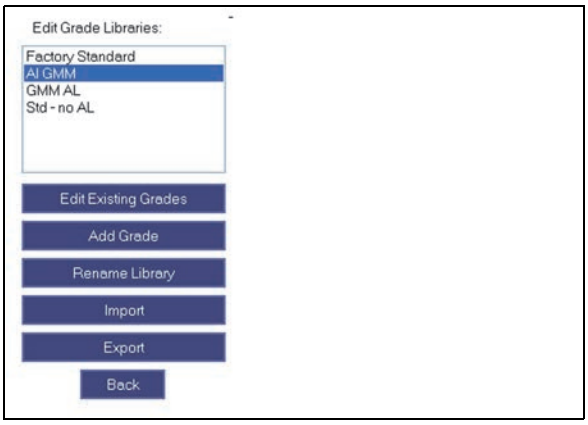


Figure 2-9 The Edit Grade Library pane

3. In the **Select Grade** pane, select a grade (see Figure 2-10 on page 55).

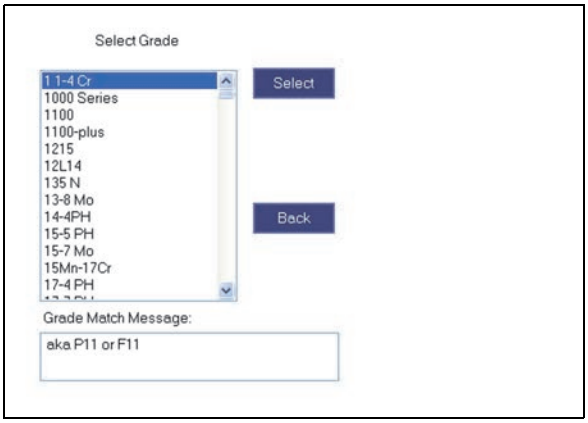


Figure 2-10 The Select Grade pane

4. Optionally create a grade match message. Grade match messaging offers:
   - Immediate sorting instructions
   - Less operator training
   - More efficiency and higher throughput.

5. Click **Select** to save your selection and display the **Min/Max** pane (see Figure 2-11 on page 56).

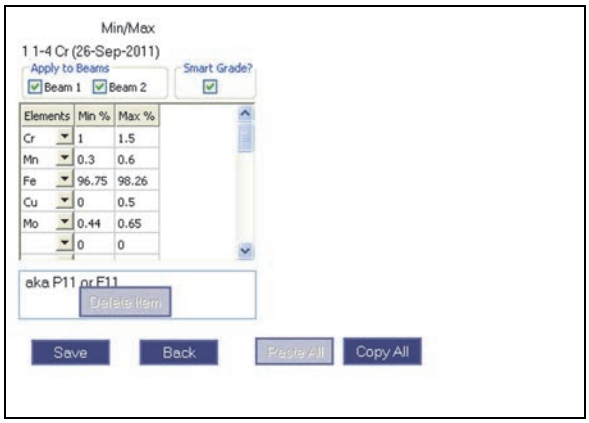


Figure 2-11 The Min/Max pane

The main purpose of the **Min/Max** pane is to edit existing elements, or add new elements to a grade. You can also:

- Apply the grade parameters to Beam 1, Beam 2 (Beam 2; Alloy Plus mode only), or both beams (Alloy Plus mode only); and,
- Select the **Smart Grade** check box to maximize speed and sorting accuracy. When you select the **Smart Grade** check box, the current grade is then selected to automatically extend testing time if more time is required for proper analysis.

To change existing elements in a grade

1. Select an **Elements** box to change that element (see Figure 2-11 on page 56).
2. Select the **Min%** or **Max%** box for a given element to change the percentage range of an element within a test sample.
3. To create a new element, select an empty **Elements** box, and then assign min/max values.
4. Click **Save** to save your changes.

To rename a grade

1. In the **Select Grade** pane, select a grade, and then click **Rename** (see Figure 2-12 on page 57).

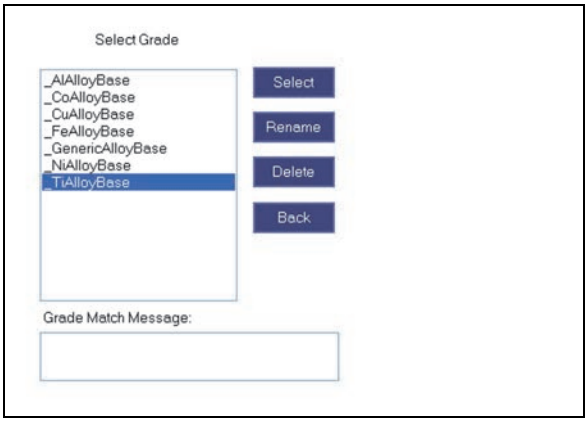


Figure 2-12 The Select Grade pane

2. In the **Rename** pane, type a new name in the **Rename Grade** box.
3. Click **Save** to save your changes.

To delete a grade

1. In the **Select Grade** pane, select a grade, and then click **Delete** (see Figure 2-13 on page 57).
   A dialog box appears prompting you to confirm your selection.
2. Click **Yes**.

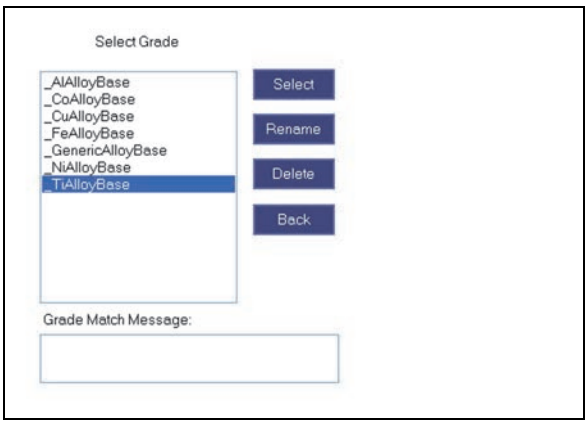


Figure 2-13 The Select Grade pane

To add a new grade

NOTE
You cannot add a new grade to the Factory Grade library.

1. In the **Edit Grade Libraries** pane (see Figure 2-9 on page 55), click **Add Grade**.
   The **Add Grade** pane appears (see Figure 2-14 on page 58).

2. In the **New Grade** box, enter a new grade name.

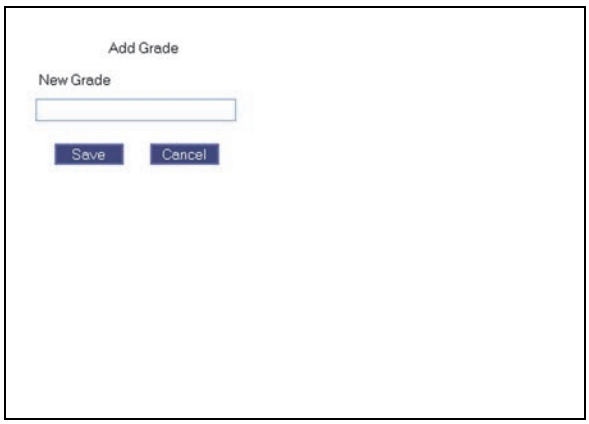


Figure 2-14 The Add Grade pane

3. Click **Save** to display a **Min/Max** pane with blank fields (see Figure 2-15 on page 58).

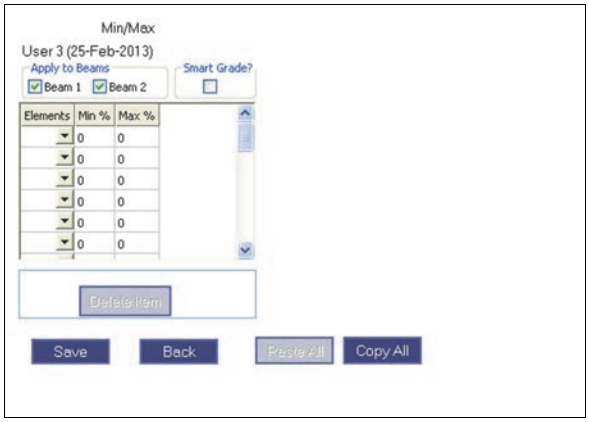


Figure 2-15 The Min/Max pane

4. Select a field, and enter element symbols and parameter values.
5. To see more empty fields, use the scroll bar.
6. Click **Save** to save your changes.

NOTE

To accurately complete the procedure for adding a new grade, you must have a list of the minimum and maximum allowable concentrations of each element in the new grade. It is important to include all elements that may be present in an alloy, including balance elements.

To rename an existing library

NOTE

You cannot rename the Factory Grade library.

1. From the **Edit Grade Libraries** pane, click **Rename Library**.
2. In the **Custom Library** box, type a new library name (see Figure 2-16 on page 59).
3. Click **Save** to save your changes.

Figure 2-16 The Rename [library] pane

To export a Grade library

NOTE

You can import data into all the libraries, including the Factory Grade library. However, Olympus does not recommend that you change the Factory Grade library.

1. From the **Edit Grade Libraries** pane, click **Export** (see Figure 2-17 on page 59).

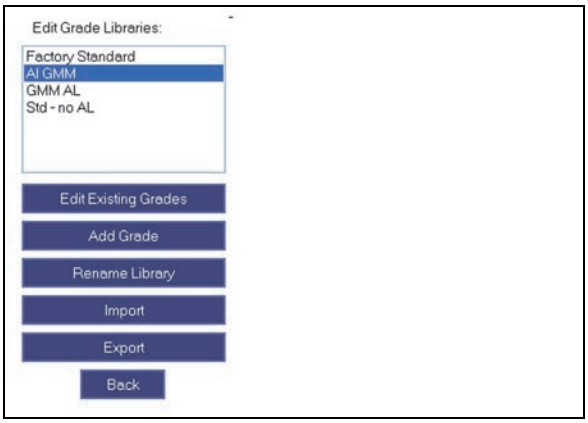


Figure 2-17 The Edit Grade Libraries pane

2. In the **Save As** dialog box, click the **New Folder** button to create a new folder in the **My Documents** folder.
3. Navigate to the new folder and then click **Save** to export the grade library.

To import a Grade Library

1. Under **Edit Grade Libraries**, select the grade library that you want to receive the imported grades (see Figure 2-18 on page 60).

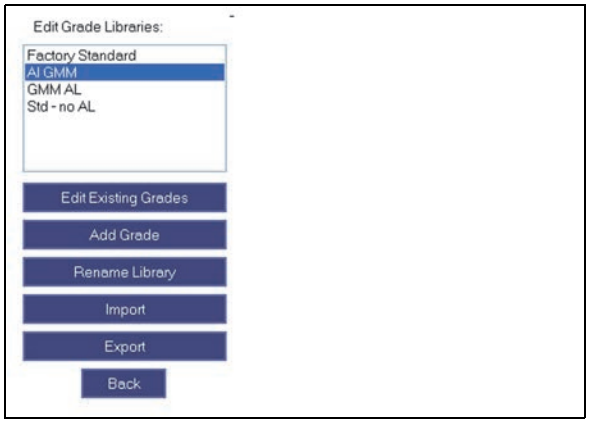


Figure 2-18 The Edit Grade Libraries pane

2. Click **Import** to display the **Save As** dialog box.
3. Use the scroll bar to navigate to the file you want to import.
4. Select the file and click **OK** to complete the file import.

2.5.4 Creating a Pass-Fail / Select Grade Operation

The Pass-Fail / Select Grade Mode is designed for high-throughput alloy sorting and quality control. Pass-Fail is one of the most useful features within the Alloy or Alloy Plus modes.

IMPORTANT

In Alloy Plus mode, ensure that **SmartSort** is selected in **Alloy Plus Options**. For Alloy Mode, ensure that QuickSort is selected in Alloy options.

To create a Pass/Fail operation

1. In the **Grade Libraries** pane, click **Pass Fail / Select Grade** to display the **Pass Fail / Select Grade Mode** pane (see Figure 2-19 on page 61).
2. Under **Pass Fail / Select Grade Mode**, select a **Pass Fail** option.
3. Click **Set Selected Grade** to display the **Edit Grade Libraries** pane.

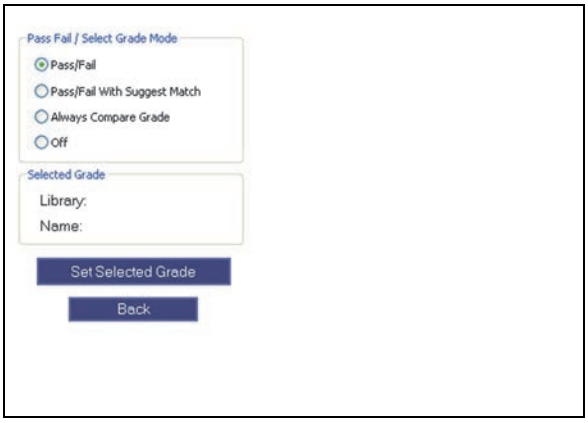


Figure 2-19 Pass Fail / Select Grade Mode pane

4. Under **Edit Grade Libraries**, select the library that contains the target alloy grade (see Figure 2-20 on page 61).

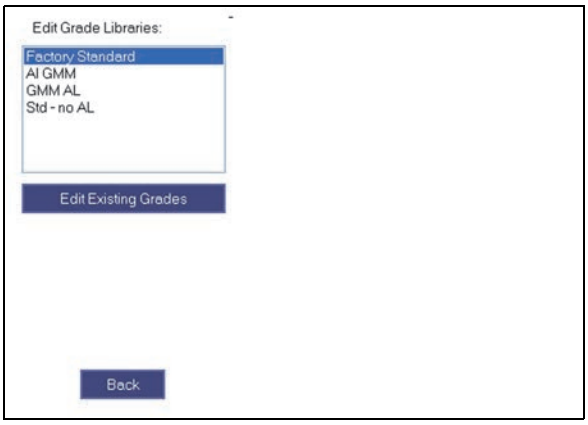


Figure 2-20 The Edit Grade Library pane

5. Click **Edit Existing Grade** to display the **Select Grade** pane (see Figure 2-21 on page 61).

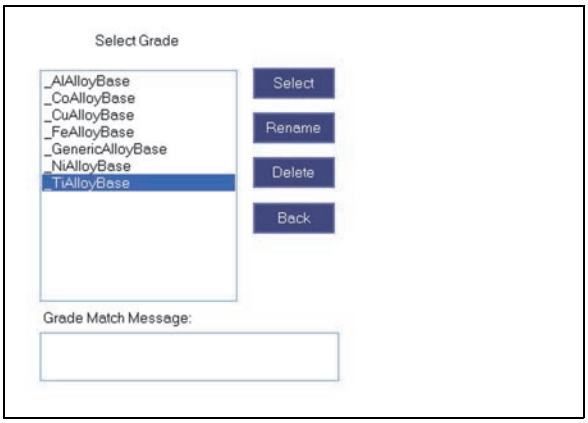


Figure 2-21 The Select Grade pane

6. Select the desired grade.
7. Click **Select** to save your selection and return to the **Pass Fail / Select Grade Mode** pane (see Figure 2-22 on page 62).

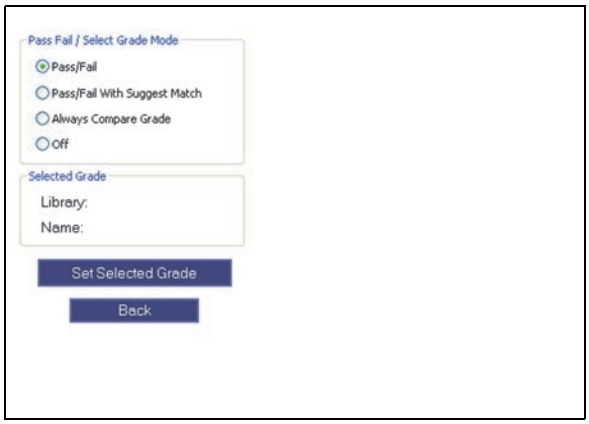


Figure 2-22 The Pass Fail / Select Grade Mode pane

8. Click **Back** to return to the **Grade Libraries** pane (see Figure 2-23 on page 62).

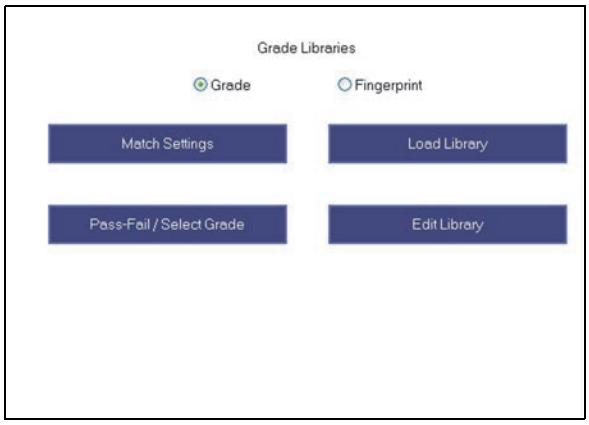


Figure 2-23 The Grade Libraries pane

3. Soil, Mining, and Geochem Test Conditions

Soil, Mining, Mining Plus, and Geochem modes are similar except for the number of beams used in testing. Other differences are noted when applicable.

Mode setup involves setting test conditions using the **Test Time**, **Beam Setup**, **User Factor** and **Packaging Directive** tabs. Settings are accessed from the **Test Condition** pane (see Figure 3-1 on page 63).

Figure 3-1 The Set Up window – Soil mode

3.1 Test Time

You can configure test parameters such as testing time, test repeat, and test end on the **Test Time** tab.

To configure Testing Time

1. Select the appropriate mode, and then click **Set Up** (see Figure 3-1 on page 63).
2. On the **Set Up** window, click the **Test Condition** icon.
3. On the **Test Time** tab, type minimum and maximum test times for each beam (see Figure 3-2 on page 64).

The test times you choose depend on the degree of precision required. Typical times for a soil or mining sample range from zero to 120 seconds. Longer test times may increase precision.

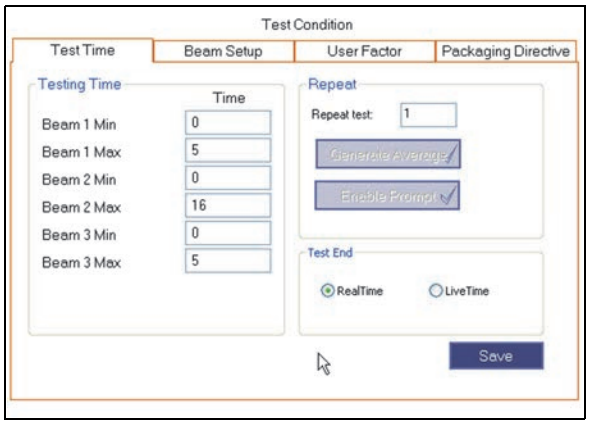


Figure 3-2 The Test Time tab

4. Apply **Repeat** variables as needed (see Figure 3-2 on page 64):
   - In the **Repeat Test** box, type the number of times you wish to repeat the test.
   - Click the **Generate Average** button to generate an average of all tests in the test set.
   - Click the **Enable Prompt** button to display a confirmation prompt before each test in a test series.
5. To choose how the **Test End** time is calculated, click **RealTime** or **LiveTime**.
   - **RealTime** is the total time that the analysis takes when measured on a standard clock. This is the most commonly selected option.
   - **LiveTime** is the actual time during which the analyzer collects data. Since the analyzer does not always collect data throughout a measurement, **LiveTime** is less than **RealTime**. (**LiveTime** is used primarily in laboratory applications where precise and repeatable test times are required).
6. Click **Save** to save your changes.

3.2 Beam Setup (Soil Mode)

You can enable and disable beams from the **Beam Setup** tab.

To set Beam Setup

1. Select the appropriate mode, and then click **Set Up** (see Figure 3-1 on page 63).
2. On the **Set Up** window, click the **Test Condition** icon.
3. On the **Beam Setup** tab, enable or disable beams as required (see Figure 3-3 on page 65).

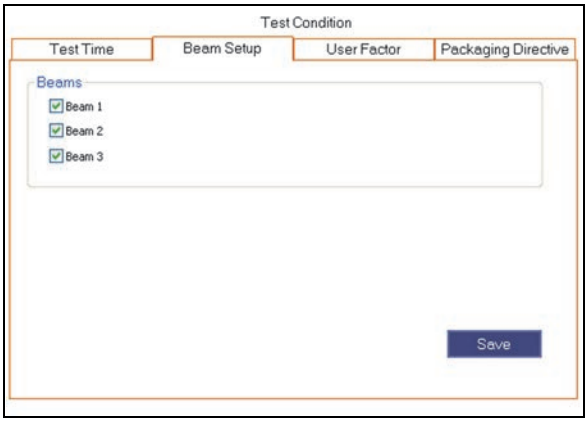


Figure 3-3 The Beam Setup tab

4. Click **Save** to save your changes.

3.3 User Factors

Your Olympus DELTA analyzer is optimized at the factory to detect a broad range of elements. You may be able to improve accuracy for your particular elements of interest by creating **User Factors** with custom **Factor** and **Offset** variables. User Factors allow you to adjust the results for your particular sample matrix. This is also known as site specific calibration.

You can create multiple User Factors and recall them at any time without altering the factory settings. See Appendix C on page 125 for more information.

To set User Factors

Before you begin, determine appropriate **Factor** and **Offset** values for your particular elements of interest.

1. Select the appropriate mode, and then click **Set Up** (see Figure 3-1 on page 63).
2. On the **Set Up** window, click **Test Condition**.
3. On the **User Factors** tab, click **Add** (see Figure 3-4 on page 66).
4. Click in the **Name** box to name the selected factor.
5. Using the scroll bar, select an element of interest.

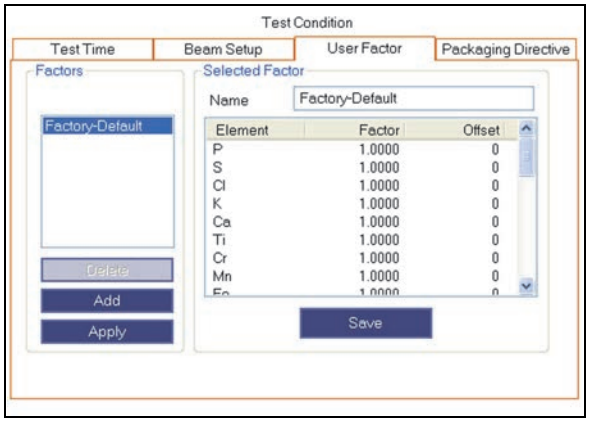


Figure 3-4 The User Factor tab

6. Enter **Factor** and **Offset** values for that element.
7. Continue selecting elements and setting factor and offset values for each element of interest.
8. Click **Save** to save your changes.
9. Select a factor set and click **Apply** to use the factors in your testing.

3.4 Packaging Directive (Optional Configuration)

Packaging Directive (PD) is a factory option available for order on Olympus DELTA analyzers. It provides a method for checking samples for compliance with European Union Packaging Directive regulations. The Packaging Directive requires that combined quantities of Cd, Cr, Hg, and Pb be less than 100 ppm by weight. The sum of these element concentrations is calculated as the "PD Value". When configured, the PD value is displayed on the window.

To set the Packaging Directive (if configured)

1. Select the appropriate mode, and then click **Set Up** (see Figure 3-1 on page 63).
2. On the **Set Up** window, click **Test Condition**.
3. On the **Packaging Directive** tab, enter the **Action** level (100 ppm by default) and **N Sigma** (3 by default) for the elements of interest (see Figure 3-5 on page 67).
4. Under **Package Directive Elements,** use the arrow buttons to include or exclude elements from the element list (Cd, Cr, Hg, and Pb are selected by default).

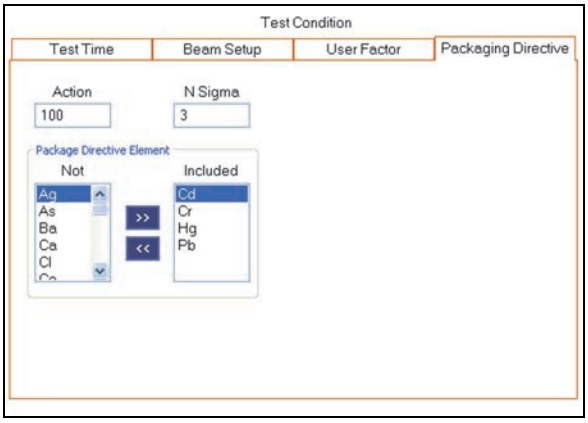


Figure 3-5 The Packaging Directive tab

4. Consumer Safety and RoHS/WEEE Test Conditions

Consumer Safety modes include RoHS/WEEE, Halogen Free, and Consumer Products. These modes are similar except for the number of beams they use for testing and their principle elements of interest. Other differences are noted when applicable.

RoHS/WEEE mode tests polymer, alloy, and mixed samples for the RoHS regulated elements Cr, Br, Cd, Hg, and Pb. Halogen Free mode tests plastics and mixed materials for bromine and chlorine content (based on total halogen limit). Consumer Products mode tests polymer, alloy, and mixed items for lead content.

Mode setup for Consumer Safety and RoHS /WEEE modes involves setting test conditions using the **Test Time**, **User Factor**, and mode specific settings tab (**RoHS** or **Consumer**). Settings are accessed from the **Test Condition** pane (see Figure 4-1 on page 69).

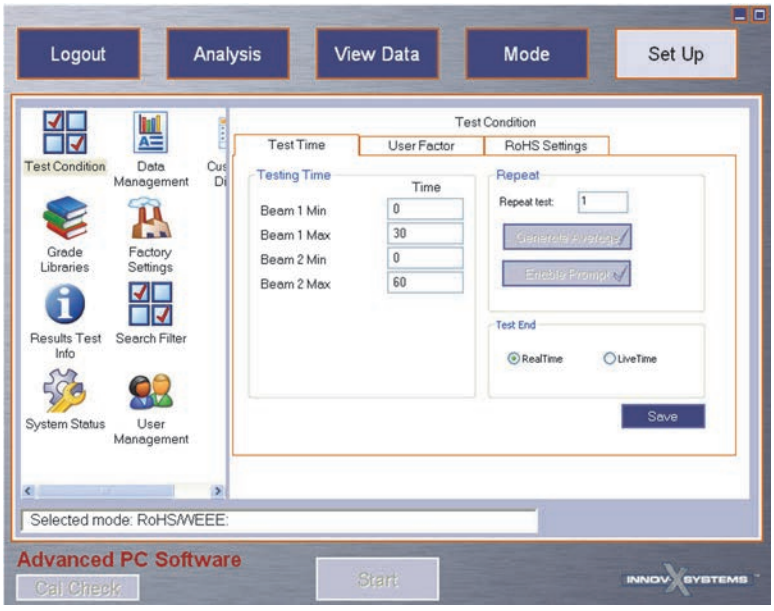


Figure 4-1 The Set Up window (RoHS/WEEE)

4.1 Test Time

You can configure test parameters such as test time, test repeat and test end on the **Test Time** tab.

To configure Test Time

1. Select the appropriate mode, and then click **Set Up** (see Figure 4-1 on page 69).
2. On the **Set Up** window, click **Test Condition**.
3. On the **Test Time** tab, type the minimum and maximum test times for each beam (see Figure 4-2 on page 70).

   The test times you choose depend on the degree of precision required. Longer test times may increase precision.

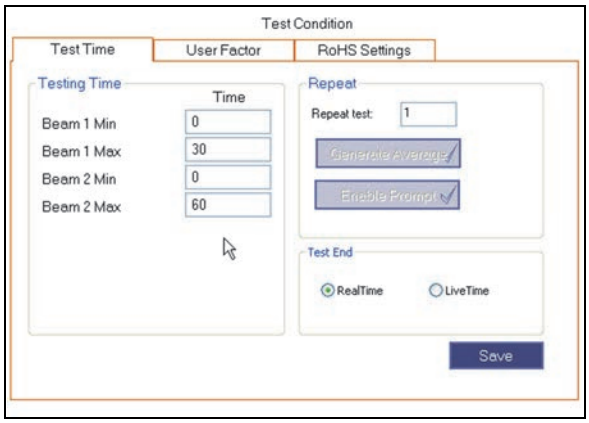


Figure 4-2 The Test Time tab

4. Apply **Repeat** variables as needed (see Figure 4-2 on page 70):
   - In the **Repeat Test** box, type the number of times you wish to repeat the test.
   - Click the **Generate Average** button to generate an average of all tests in the test set.
   - Click the **Enable Prompt** button to display a confirmation prompt before each test in a test set.
5. To choose how the **Test End** time is calculated, click **RealTime** or **LiveTime**.
   - **RealTime** is the total time that the analysis takes when measured on a standard clock. This is the most commonly selected option.
   - **LiveTime** is the actual time during which the analyzer collects data. Since the analyzer does not always collect data throughout a measurement, **LiveTime** is less than **RealTime**. (**LiveTime** is used primarily in laboratory applications where precise and repeatable test times are required).
6. Click **Save** to save your changes.

4.2 User Factors

Your Olympus DELTA analyzer is optimized at the factory to detect a broad range of elements. You may be able to improve accuracy for your particular elements of interest by creating User Factors with custom **Factor** and **Offset** variables. User Factors allow you to adjust the results for your particular sample matrix. This is also known as site specific calibration.

You can create multiple User Factors and recall them at any time without altering the factory settings. See “User Factors” on page 125 for more information.

Before you begin, determine appropriate **Factor** and **Offset** values for your particular elements of interest.

To set User Factors

1. Select the appropriate mode, and then click **Set Up** (see Figure 4-1 on page 69).
2. On the **Set Up** window, click **Test Condition**.
3. On the **User Factor** tab, click **Add** (see Figure 4-3 on page 71).
4. Click in the **Name** box to name the selected factor.
5. Using the scroll bar, select an element of interest.

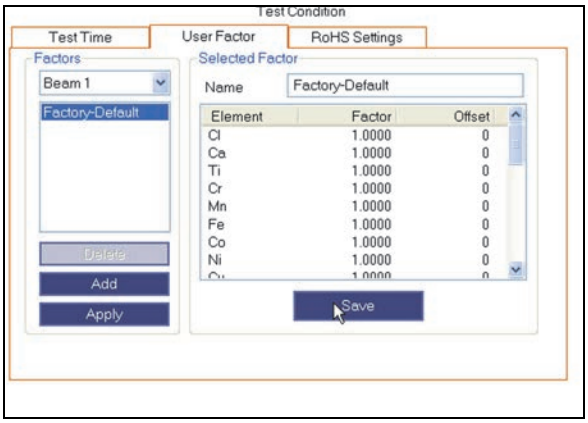


Figure 4-3 The User Factor tab

6. Enter **Factor** and **Offset** values for that element.
7. Continue selecting elements and setting factor and offset values for each element of interest.
8. Click **Save** to save your changes.
9. Select a factor set and click **Apply** to use the factors in your testing

4.3 RoHS and RoHS Plus Settings

The **RoHS Settings** tab includes these sets of parameters: **Classification**, **Beam to shoot** (RoHS Plus mode), **Action Level** and **Test End**.

The **Classification** parameters aid in the identification of certain materials.

To set Classification

1. Select the appropriate mode, and then click **Set Up** (see Figure 4-1 on page 69).
2. On the **Set Up** window, click **Test Condition**.
3. On the **RoHS Settings** tab, under **Classification**, choose the appropriate classification method (see Figure 4-4 on page 72):
   - **Automatic** – Allows the analyzer to choose which beam and calibration matches the current sample.

- **Alloy** – Always tests sample using the alloy/metals calibration (beam 2). This option is useful when testing aluminum alloys, as these will not be automatically classified as alloy.
- **Polymer** – Always tests sample using the polymer calibration (beam 1). Beam 1 is also used when testing mixed samples.

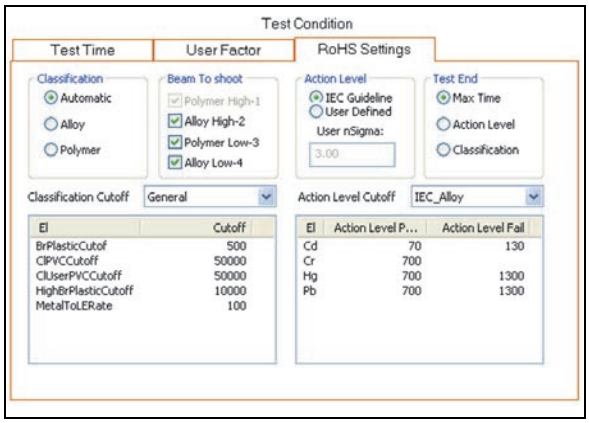


Figure 4-4 The RoHS Settings tab – Classification

To set Beam to shoot

1. On the **Test Conditions** pane, click the **RoHS Settings** tab (see Figure 4-5 on page 72).
2. Under **Beam to shoot**, select an element type.

   Beam to shoot parameters include:
   - **Polymer High-1**
   - **Alloy High-2**
   - **Polymer Low-3**
   - **Alloy Low-4**

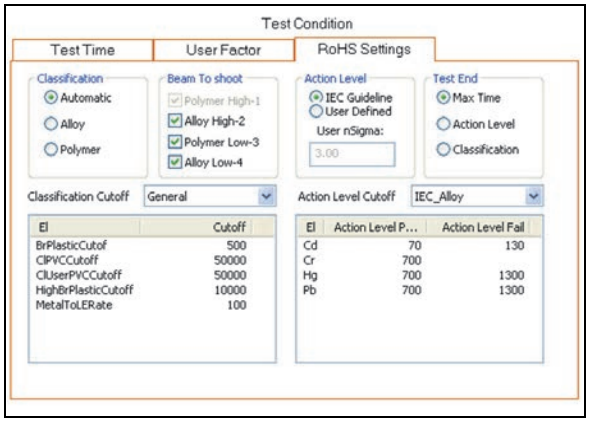


Figure 4-5 The RoHS Settings tab – Beam to shoot

To set the Action Level

1. On the **Test Conditions** pane, click the **RoHS Settings** tab (see Figure 4-6 on page 73).

2. Under **Action Level**, select **IEC Guideline** or **User Defined,** and then type a **User Defined nSigma** value (default is 3.0).

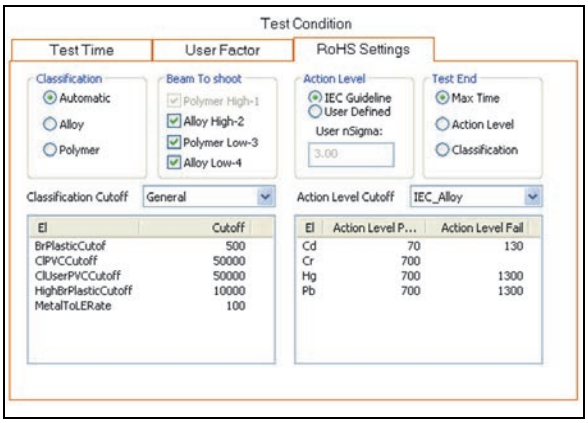


Figure 4-6 RoHS Settings tab (Action Level)

To Set Test End

1. On the **Test Conditions** pane, click the **RoHS Settings** tab (see Figure 4-7 on page 73).

NOTE

The **Test End** parameter controls when a test is terminated.

---

2. Under **Test End**, select a **Test End** type that meets your testing requirements.
   - **Max time**: The test continues for the set maximum amount of time. This option is most commonly selected.
   - **Action Level**: The test continues until Pass or Fail determination based on the action level is made.
   - **Classification**: The test continues until the sample is classified as Polymer, PVC, Mixed, or Alloy. This option is commonly used for quickly sorting PVC (Cl ≫ 1 %) and non-PVC plastics.

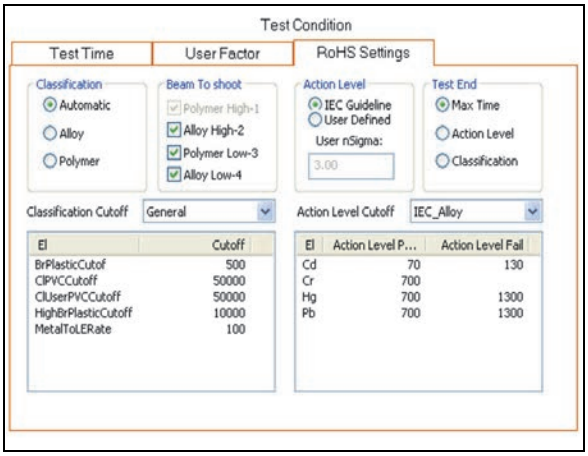


Figure 4-7 The RoHS Settings tab – Test End

To set the Classification Cutoff

1. On the **Test Conditions** pane, click the **RoHS Settings** tab (see Figure 4-8 on page 74).
2. Using the **Classification Cutoff** list, select an element type.
3. Edit element cutoff values to meet your testing requirements.

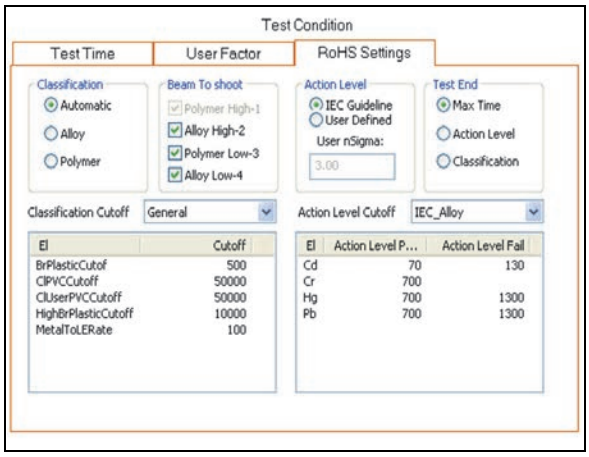


Figure 4-8 RoHS Settings tab – Classification Cutoff

To set the Action Level Cutoff

1. On the **Test Conditions** pane, click the **RoHS Settings** tab (see Figure 4-9 on page 74).
2. Using the **Action Level Cutoff list**, select an **IEC** or **User Defined** type.
3. Edit the **Action Level Pass** and **Fail** values to meet your testing requirements.

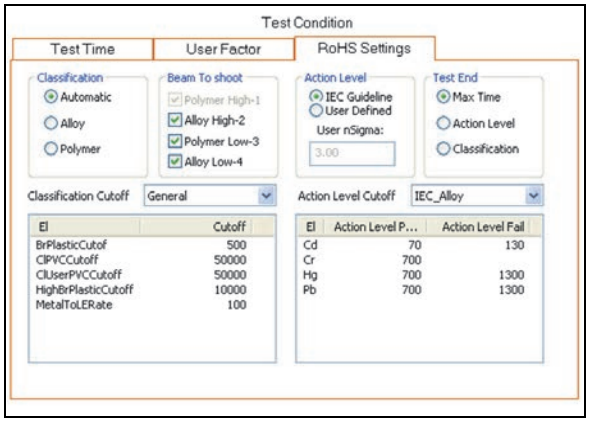


Figure 4-9 The RoHS Settings tab – Action Level Cutoff

4.4 Consumer Settings

Consumer settings include **Classification**, **Action Level**, and **Test End**.

To set Classification

1. Select the appropriate mode, and then click **Set Up** (see Figure 4-1 on page 69).
2. On the **Set Up** window, click **Test Condition**.
3. On the **Test Conditions** pane, click the **Consumer Settings** tab (see Figure 4-10 on page 75).
4. Under **Classification**, choose the appropriate classification method:
   - **Automatic** – Allows the analyzer to choose which beam and calibration matches the current sample.
   - **Alloy** – Always tests the sample using the alloy/metals calibration (beam 2). This option is useful when testing aluminum alloys, as these will not be automatically classified as alloy.
   - **Polymer** – Always tests the sample using the polymer calibration (beam 1). Beam 1 is also used when testing mixed samples.

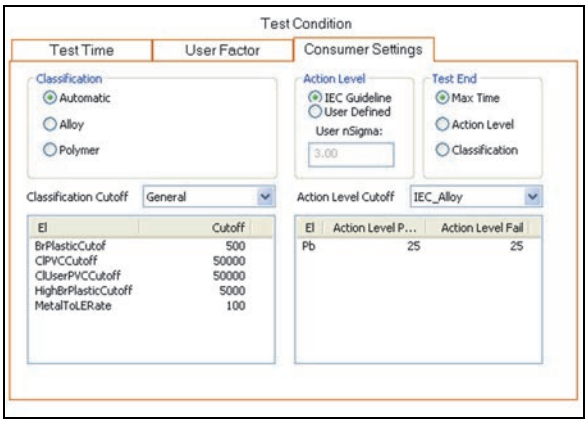


Figure 4-10 The Consumer Settings tab – Classification

To set the Action Level

1. On the **Test Conditions** pane, click the **Consumer Settings** tab (see Figure 4-11 on page 76).
2. Under **Action Level**, select **IEC Guideline** or **User Defined**, and then enter a **User Defined nSigma** value (the default is 3.0).

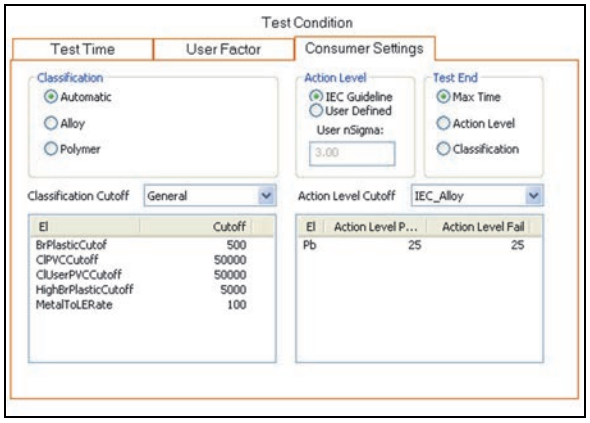


Figure 4-11 The Consumer Settings tab – Action Level

To set the Test End

1. On the **Test Conditions** pane, click the **Consumer Settings** tab (see Figure 4-12 on page 76).
2. Under **Test End**, choose a type of **Test End Condition** that meets your testing requirements.
   - **Max time**: The test continues for the set maximum amount of time. This option is most commonly selected.
   - **Action Level**: The test continues until Pass or Fail determination based on the action level is made.
   - **Classification**: Test continues until sample is classified as Polymer, PVC, Mixed, or Alloy. This option is commonly used for quickly sorting PVC (Cl ≫ 1 %) and non-PVC plastics.

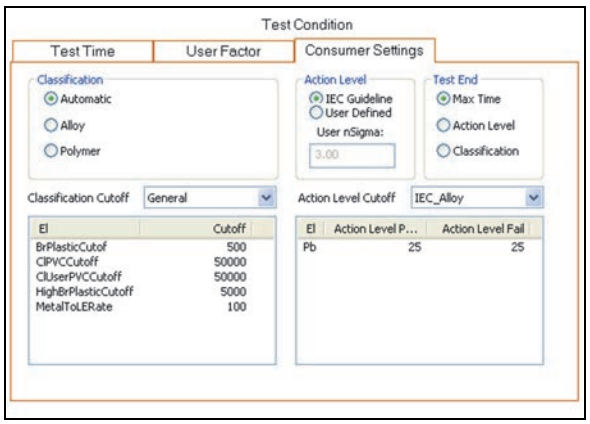


Figure 4-12 The Consumer Settings tab – Test End

To set the Classification Cutoff

1. On the **Test Conditions** pane, click the **Consumer Settings** tab (see Figure 4-13 on page 77).
2. Using the **Classification Cutoff** list, select an element type.

3. Edit element cutoff values to meet your testing requirements.

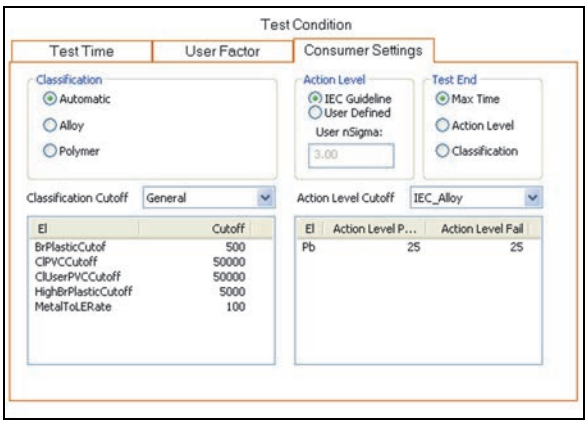


Figure 4-13 The Consumer Settings tab – Classification Cutoff

To set the Action Level Cutoff

1. On the **Test Conditions** pane, click the **Consumer Settings** tab (see Figure 4-14 on page 77).
2. Using the **Action Level Cutoff** list, select an **IEC** or **User Defined** type.
3. Edit the **Action Level Pass** and **Fail** values to meet your testing requirements.

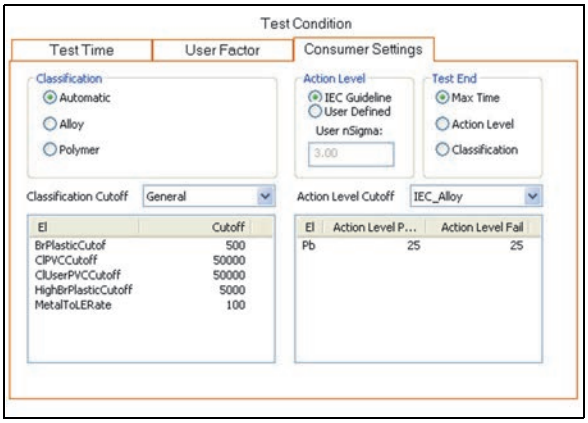


Figure 4-14 The Consumer Settings tab – Action Level Cutoff

5. Thin Modes Test Conditions

Thin modes include Dust Wipe, Filter Analysis, and Lead Paint. These modes are relatively similar, except for the number of beams used in testing. Other differences are noted where applicable.

Mode setup involves setting test conditions using the **Test Time**, **User Factor** (Dust Wipe and Filter Analysis), and **Lead Paint Option** (Lead Paint only) tabs. Settings are accessed from the **Test Condition** pane (see Figure 5-1 on page 79).

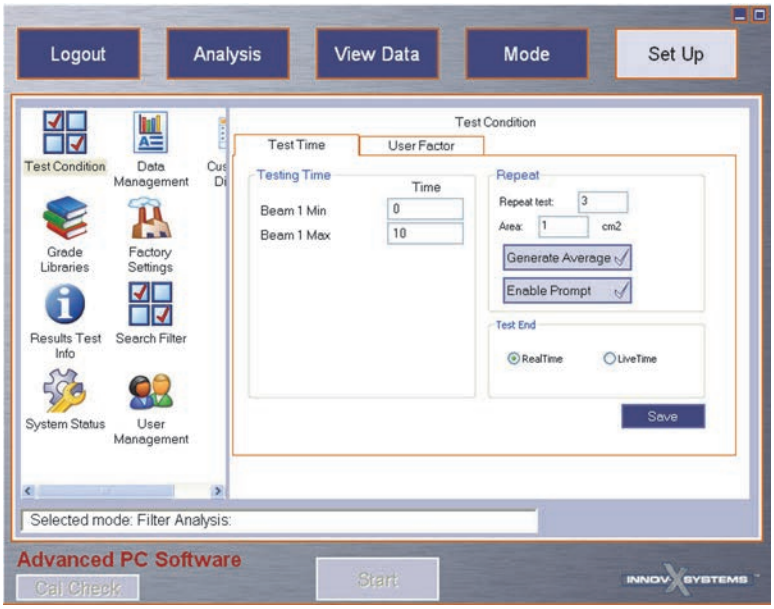


Figure 5-1 The Set Up window – Filter Analysis mode

5.1 Test Time

You can configure test parameters such as test time, test repeat, and test end on the **Test Time** tab.

To configure Test Time

1. Select the appropriate mode, and then click **Set Up** (see Figure 5-1 on page 79).
2. On the **Set Up** window, click **Test Condition**.
3. On the **Test Time** tab, type the minimum and maximum test times for each beam (see Figure 5-2 on page 80).

The test times you choose depend on the degree of precision required. Longer test times may increase precision.

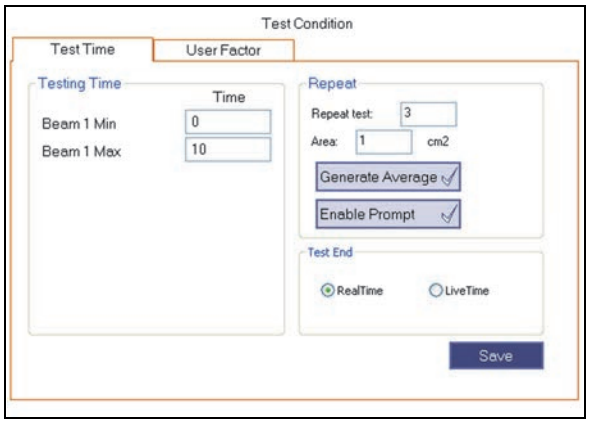


Figure 5-2 Test Time tab – Lead Paint

4. Apply **Repeat** variables as needed (see Figure 5-2 on page 80):
   - In the **Repeat Test** box, type the number of times you wish to repeat the test (Filter and Lead Paint modes).
   - In the **Area** box, type the size of the area being tested (Dust Wipe and Filter modes).
   - Click the **Generate Average** button to generate an average of all tests in the test set (Dust Wipe and Filter modes).
   - Click the **Enable Prompt** button to display a confirmation prompt before each test in the test set (Filter and Lead Paint modes).
5. To choose how the **Test End** time is calculated, click **RealTime** or **LiveTime**.
   - **RealTime** is the total time that the analysis takes when measured on a standard clock This is the most commonly selected option.
   - **LiveTime** is the actual time during which the analyzer collects data. Since the analyzer does not always collect data throughout a measurement, **LiveTime** is less than **RealTime**. (**LiveTime** is used primarily in laboratory applications where precise and repeatable test times are required).
6. Click **Save** to save your changes.

5.2 User Factors

Your Olympus DELTA analyzer is optimized at the factory to detect a broad range of elements. You may be able to improve accuracy for your particular elements of interest by creating User Factors with custom **Factor** and **Offset** variables. User Factors allow you to adjust the results for your particular sample matrix. This is also known as site specific calibration.

You can create multiple User Factors and recall them at any time without altering the factory settings. See “User Factors” on page 125 for more information.

Before you begin, determined the appropriate **Factor** and **Offset** values for your particular elements of interest.

To set User Factors (Dust Wipe and Filter Analysis)

1. Select the appropriate mode, and then click **Set Up** (see Figure 5-1 on page 79).
2. On the **Set Up** window, click **Test Condition**.
3. On the **Test Conditions** pane, click the **User Factor** tab (see Figure 5-3 on page 81).
4. Under **Factors**, click **Add**.
5. Click in the **Name** box to rename the selected factor.
6. Using the scroll bar, select an element of interest.

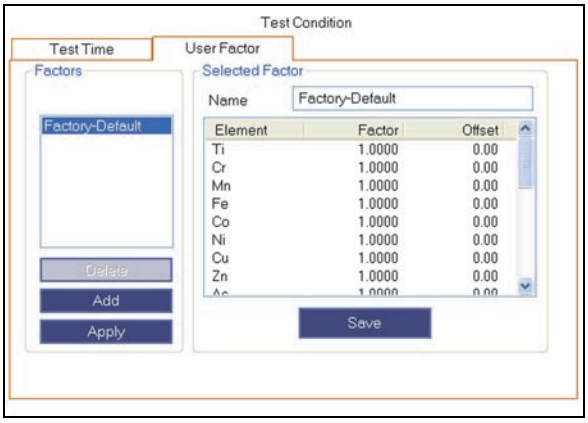


Figure 5-3 The User Factor tab – Dust Wipe

7. Enter **Factor** and **Offset** values for the selected element (see Figure 5-3 on page 81).
8. Continue selecting elements and setting factor and offset values for each element of interest.
9. Click **Save** to save your changes.
10. Select a factor set and click **Apply** to use the factors in your testing

5.3 Lead Paint Option (Test End Condition)

Test end conditions particular to lead paint mode are accessed on the **Test Conditions** pane.

To set the Lead Paint Option (Lead Paint mode only)

1. Select the appropriate mode, and then click **Set Up** (see Figure 5-1 on page 79).
2. On the **Set Up** window, click **Test Condition**.
3. On the **Test Condition** pane, click the **Lead Paint Option** tab (see Figure 5-4 on page 82).
4. Under **Test End Condition** choose one of the following options:
   - Select **Inspection** to end the test when the inspection parameter is met.
   - Select **Fixed Time** to end the test when a previously set time is reached.
5. Apply these additional options as needed:
   - To modify the **Action level** (1.0 mg/cm^2 by default), type a new value in the box.
   - To display statistical error (+/-) information on the view data window, click the **Display Statistical Error** button.
6. Click **Save** to save your changes.

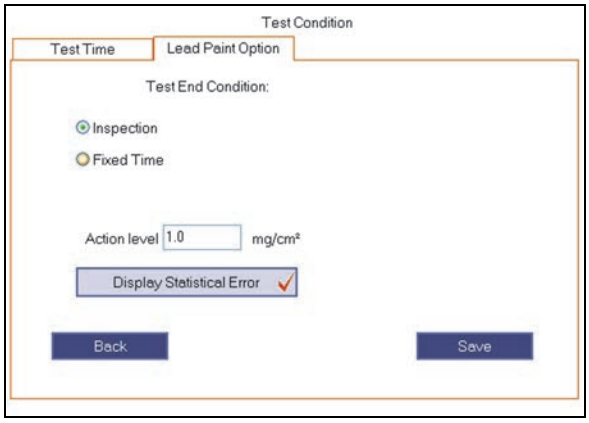


Figure 5-4 The Lead Paint Option tab

6. Empirical Mode

Empirical mode allows you to use your own standards to create and store calibration models on the PC. You can then export the models to the analyzer and use them in custom applications.

Calibration models consist of a group of measured standards with assays and one or more calibration curves. Standards and calibration curves are explained in more detail as follows:

Standards – Empirical mode requires type-specific calibration samples. These samples should be thoroughly characterized, and concentrations should be known to a high degree of accuracy. Standard concentration values should bracket the range of concentrations expected in the unknown samples and the matrix should be consistent with that of the unknown samples. Standards and samples should be prepared by the same method to minimize sample preparation errors.

Curves – One calibration curve is built per selected element within a model. A curve is based on measured standards with assays using selected **rate types** and **fit types**.

Rate types

- Raw rate – Uses all counts within an elemental region defined for that element by the regions table. There is no background subtraction, peak overlap corrections, or normalization.
- Net rate – Uses raw rates minus the air background.
- Adjusted rate – Reflects adjustments for air background and peak overlap. Peak overlap is the elemental interference from other elements in the sample that have peak energies close to the element of interest. This is the same calculation used in Filter and Dust Wipe mode and is usually ideal for plating or coatings applications.
- Normalized rate – Normalizes the selected rate based on the sum of all rates detected above 3-sigma.
- Compton-Normalized rates – The scatter effect from light elements is also known as Compton scattering. For each element, the adjusted rate is divided by the scatter produced in the light element (LE) region of the sample. This option is ideal for samples with high quantities of light elements and provides the best correction for matrix effects caused by density variations. This same calculation is used in Soil Mode.

Fit Types

- Linear – Ideal for narrow calibration ranges. A minimum of two standards are required, but at least four are recommended for a good fit.
- Quadratic – Better for broader calibration ranges; however, a large number of standards are necessary to model this range. Three is required by the software, but ten is recommended for a better fit.

- Zero Offset – Allows either the Linear or Quadratic fit type to be forced through zero. The addition of an offset can help to correct for matrix differences between the calibration standards and factory calibrated base material.

6.1 Setting up Empirical Mode

Setting up Empirical mode consists of the following steps:

- Creating and populating the Calibration Standard Library
  First, a new library is created for the standard assays.
- Building calibration models
  For each application a calibration model is established.
- Activating, testing, and exporting models to the DELTA

To create the Calibration Standard Library

1. Click **Set Up** (see "Starting the DELTA PC Software" on page 7 for instructions on navigating the DELTA PC Software UI).
2. Click the **Test Condition** icon ( ) to display the **Test Condition** pane (see Figure 6-1 on page 84).
3. Click the **Calibration** tab.

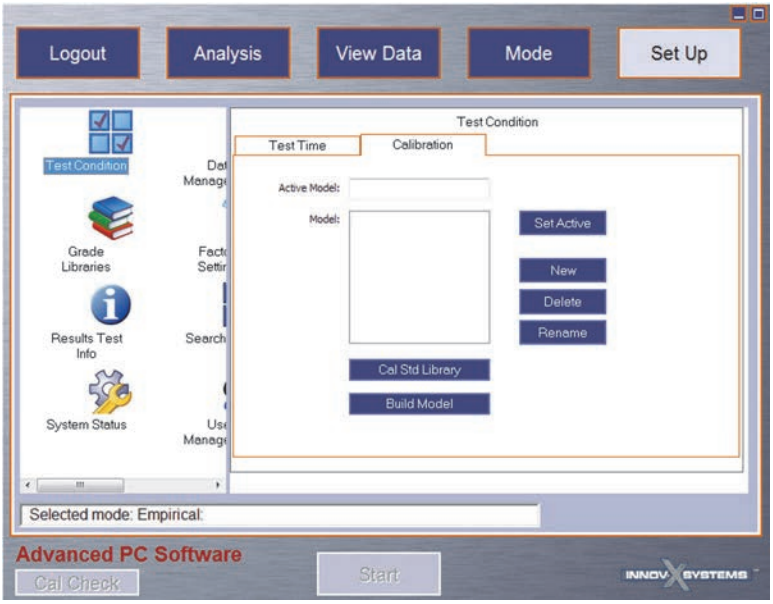


Figure 6-1 The Test Condition pane – Calibration tab

4. Click **Cal Std Library** to display the **Cal Std Library** pane (see Figure 6-2 on page 85).

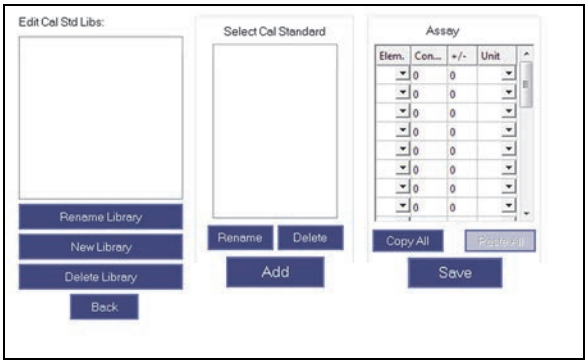


Figure 6-2 The Cal Std Library pane

5. Click **New Library** to display the **Add New Library** pane (see Figure 6-3 on page 85).

Figure 6-3 The Add New Library pane

6. Under **Library Name**, type a library name, and then click **Save**.
   You can add multiple libraries to organize standards as needed.

To populate the Calibration Standard Library

1. Select a library name in the **Edit Cal Std Libs** list (see Figure 6-4 on page 85).

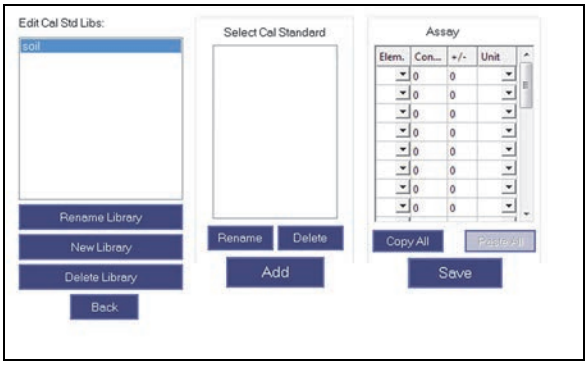


Figure 6-4 A selected library name

2. Click **Add** (below the **Select Cal Standard** list).
3. Under **Add Cal Standard**, enter a new calibration standard name (see Figure 6-5 on page 86).

Figure 6-5 The Add Cal Standard pane

4. Click **Save**.
5. Select a standard in the **Select Cal Standard** list (see Figure 6-6 on page 86).

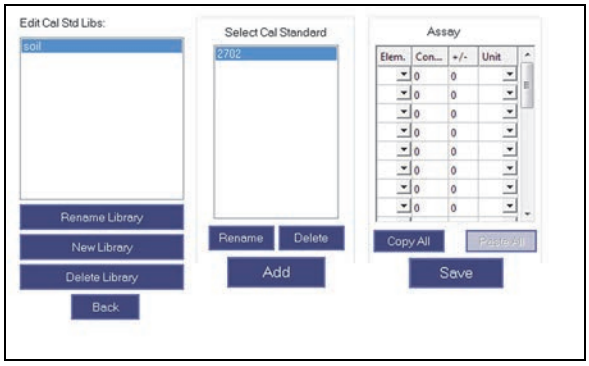


Figure 6-6 A selected calibration standard

6. In the **Assay** box, under **Elem**, select an element from a list.
7. Enter values for that element, if known, in the concentration (**Con...**) and precision (**+/-**) fields.
8. Under **Units**, select a unit from the list.

   You can also enter units (that are not listed) directly into the **Units** field

---

NOTE

You are not required to populate the **Unit** field in the **Assay** box, as this field is provided to facilitate record keeping. See Figure 6-7 on page 87 for an example of a populated assay list.

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9. Click **Back** to return to the **Test Condition** pane.

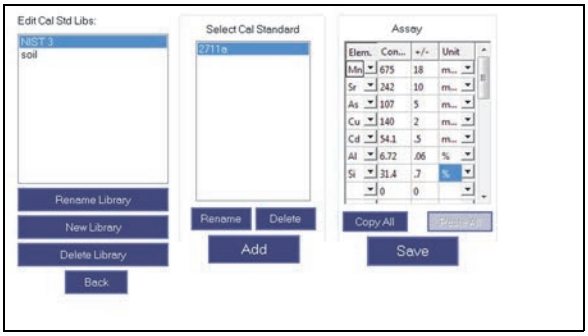


Figure 6-7 Elemental information in the Assay box

Building a calibration model

1. On the **Test Condition** pane, click **New** to display the **New Calibration Model** pane (see Figure 6-8 on page 87).
2. Under **Model Name**, type a name, and then click **Save**.

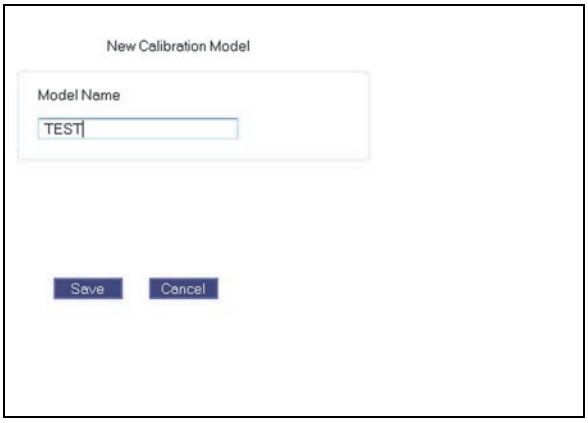


Figure 6-8 The New Calibration Model pane

3. On the **Test Condition** pane, click **Build Model** to display the next pane (see Figure 6-9 on page 88).
4. Select a model in the **Model** list (at the top of the pane).
5. Select a unit in the **Units** list.
   You can also enter units (that are not listed) directly into the **Units** field.

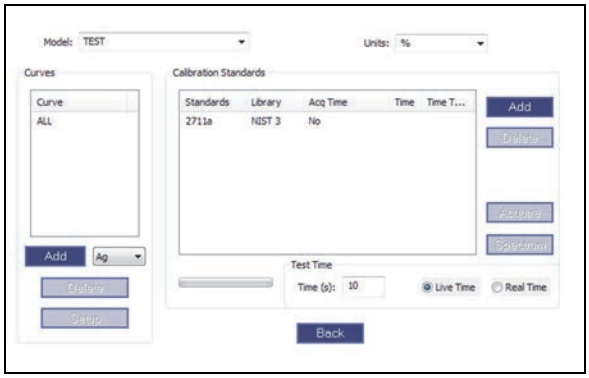


Figure 6-9 Model and Units selection

6. Click **Back**, and then click **Build Model** to display the **Build Model** pane.
7. In the **Calibration Standards** box, click **Add**.
8. On the **Calibration Standard Selection** pane, select a library in the **Standard Library** list (see Figure 6-10 on page 88).
9. Under **Standards**, select a standard in the list, and then click **OK**.

   To select multiple **Standards**, press and hold the CTRL key, and then click on multiple standards.

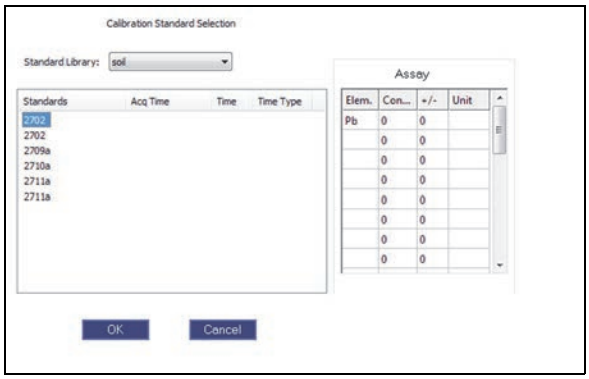


Figure 6-10 Calibration Standard Selection pane

10. Click **OK** to return to the **Build Model** pane.

To acquire a standard spectrum

1. In the **Calibration Standards** box, select a standard (see Figure 6-11 on page 89).
2. Under **Test Time**, type a time in the **Time** box, and then select **Live Time** or **Real Time**.

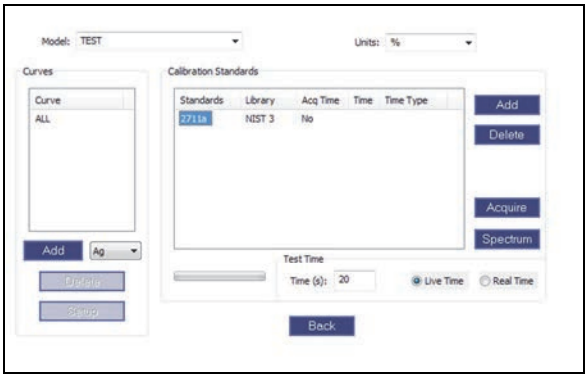


Figure 6-11 Ready to acquire a calibration standard

3. If your DELTA is not already connected to the computer through a USB connection, connect it and restart the PC Software (see "To reconnect a DELTA analyzer to the DELTA PC Software" on page 7).
4. If necessary, perform a Cal Check (see "To conduct a Cal Check" on page 96).
5. Place the standard in front of the analyzer window, and click **Acquire**.

   The green bar and the message box indicate the progress of the acquisition. Once the acquisition is complete, the **Calibration Standards** box updates to reflect the date, time, elapsed test time, and time type used to acquire the shot (see Figure 6-12 on page 89).

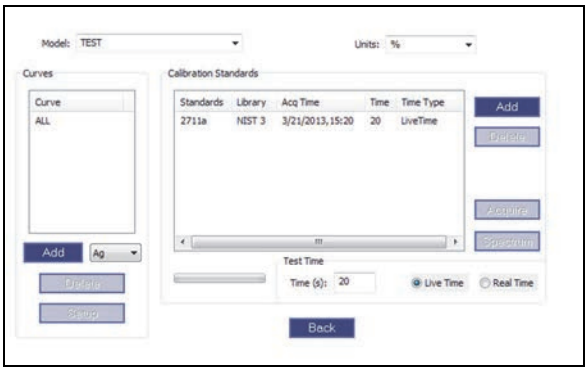


Figure 6-12 A cal standard with acquisition data

6. To replace a shot, select the standard, and then click **Acquire**.

   The existing acquisition data will be permanently replaced.
7. To view the shot spectrum, select the standard, and then click **Spectrum**.

   When you are finished viewing the spectrum, click **Back** to return to the **Build Model** pane.

To define standard curves

1. Under **Curves**, select an element in the list (beside the **Add** button).
2. Click **Add** to move the selected element into the **Curve** list.
3. Select the element in the **Curve** list.
4. To view all standards used for all the curves in that model, select **ALL** in the **Curve** list.

To remove a curve from the **Curve** list, select the curve, and then click **Delete**.

5. Under **Calibration Standards,** click the **Add** button.
6. On the **Calibration Standard Selection** pane, select one or more standards in the **Standards** list.
7. Click **OK**.

To set up and view curves

1. Select the element in the **Curve** list, and then click **Setup** to display the C**urve** setup pane (see Figure 6-13 on page 90).
2. Select a **Rate** type.
3. Select a type of **Normalization** rate.
4. Select a **Fit Type**.
5. To force the curve through zero, select the **Zero Offset** check box.

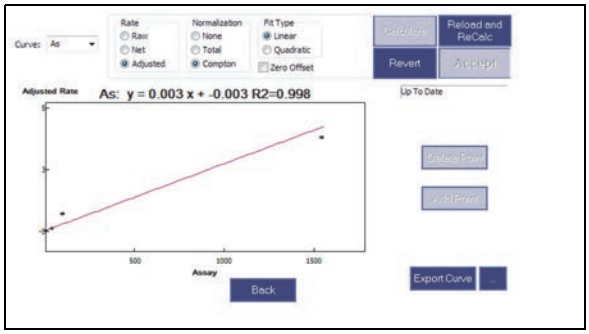


Figure 6-13 Curve parameter selection

6. To display the curve with the current settings, click **Calculate** (see Figure 6-14 on page 90).
7. To undo changes, click **Revert**.
8. Click **Accept** to apply and save the current settings to the model.
   If you make changes to the curve options, click **Calculate** again to view the changes.

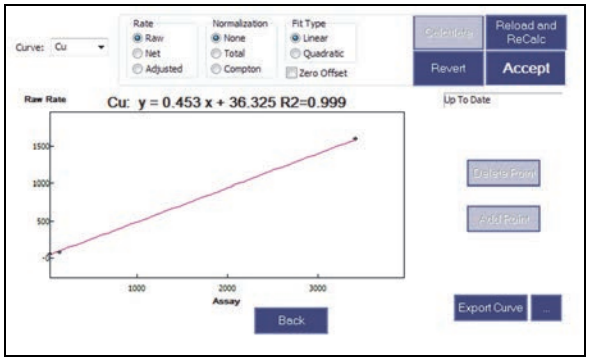


Figure 6-14 Curve display

9. To display a list of other standards that have been acquired, click **Add Point**.

10. To delete a specific point on the curve, click the point, and then click **Delete Point**.

To view standard values by point

- Double click on a point on the graph to display the **Assay** dialog box (see Figure 6-15 on page 91).
  The **Assay** dialog box displays information for that standard.

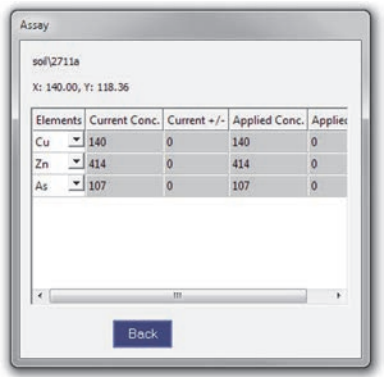


Figure 6-15 The Assay dialog box

Points on the curve will appear in red if the assay information is edited (in the Cal Std Library pane) after curve creation.

To view and accept edited assay information

1. Double click on the red point to view its assay information in the **Assay** dialog box (see Figure 6-16 on page 91).
   The value previously in use on the curve is displayed in the **Applied Conc.** column. The value displayed in the **Current Conc.** column reflects the new assay value.

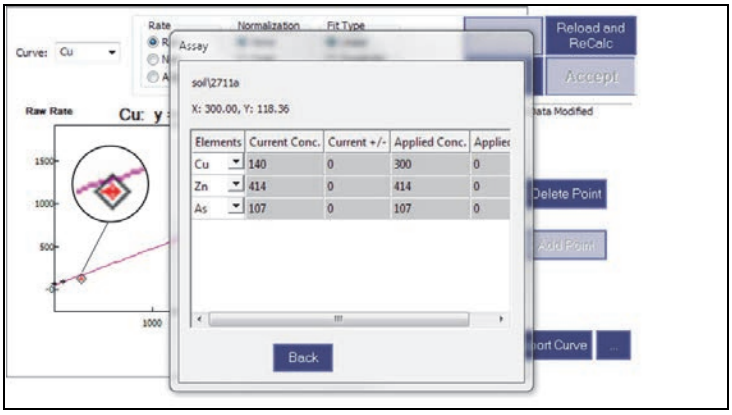


Figure 6-16 A red point shows edited info

2. Click **Back** to close the **Assay** dialog box.
3. To apply the new assay value, click **Reload and ReCalc**.
4. In the dialog box, click **Yes** (see Figure 6-17 on page 92).

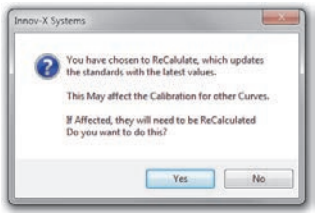


Figure 6-17 The ReCalculate dialog box

5. Double click on the point (that was previously red) to view its assay information (see Figure 6-18 on page 92).

   The **Applied Conc.** column and the **Current Conc.** column are both the same value.

Figure 6-18 The Assay dialog box after Reload and Recalc

6. Click **Accept** to accept the recalculated assay values.

To export curve settings and rate results

1. To export the curve settings and rate results for each point on the current curve, click **Export Curve**.

   A comma separated value (csv) file named EmpiricalCurve_Empirical_*Model Name*.csv is exported to the PC. The exact export location depends on the version of Windows:

   - Windows XP

     C:\Documents and Settings\All Users\Application Data\Innov-X Systems\Profiles*DELTA serial number*\Data\CalibrationSummary

   - Windows 7

     C:\ProgramData\Innov-X Systems\Profiles*DELTA serial number*\Data\CalibrationSummary

2. To change the export path click the path button (...) to display the **Export** pane.
3. On the **Export** pane, type a directory name or click the path button to browse for a directory.
4. To change the **Filename**, cancel the selection of the **Auto-Generate** check box, and then enter a file name.
5. Click **Save**.

6.2 Activating, Testing and Exporting Empirical Mode Data

Once set up of Empirical mode is complete, you must activate it, test it, and export the mode data back to the DELTA.

To activate Empirical mode

1. On the **Test Condition** pane, click the **Calibration** tab, and then select a model from the **Model** list (see Figure 6-19 on page 93).

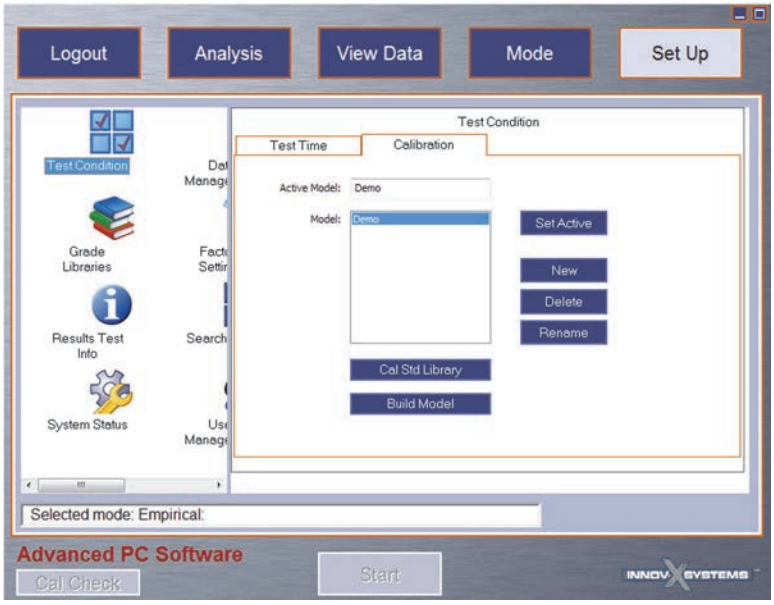


Figure 6-19 The Test Condition pane – model selected

2. Click **Set Active** to activate that model.

To test Empirical mode

1. Click the **Test Time** tab.
2. Enter testing time parameters, set up repeat testing, and choose **RealTime** or **LiveTime** (see "Test Time" on page 46 for detailed instructions about the **Test Time** tab).
3. Click **Analysis** to display the **Analysis** window.

   The name of the active model is displayed at the top of the Analysis pane.
4. Run tests as necessary.

To export Empirical mode data to the DELTA

1. Click **Logout** to display the **Logout** window.
2. Click **Exit** to return to the profile manager.
3. Make sure the DELTA is connected to the PC, and then click **Export Empirical Mode to Unit** to initiate transfer of the instrument profile to the DELTA.

To select an empirical model on the DELTA analyzer

1. On the **Home** screen, click the **Mode** icon (), and then click **Empirical**.
2. Click the **Test** icon ().
3. On the **Test** screen, click the **Tools** icon ().
4. On the **Test Setup** screen, click **More**.
5. On the **Test Conditions** screen, select a model, and then click **Load** (see Figure 6-20 on page 94).

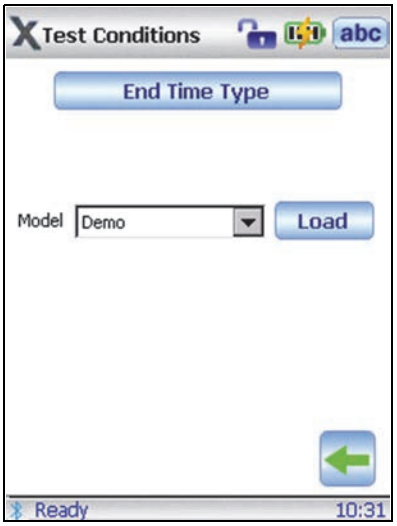


Figure 6-20 The DELTA analyzer Test Conditions screen

6. Click the back arrow to return to the **Test Setup** screen.
7. Click the back arrow to return to the **Test** screen.

To read the exported results

- Look in the **User Factor** column of the report for the name of the active empirical model.

7. Analysis

Sample testing, result monitoring and instrument calibration are accessed using the **Analysis** window (see Figure 7-1 on page 95). This section describes the preliminary steps required before conducting a test, a typical test procedure, and testing best practices.

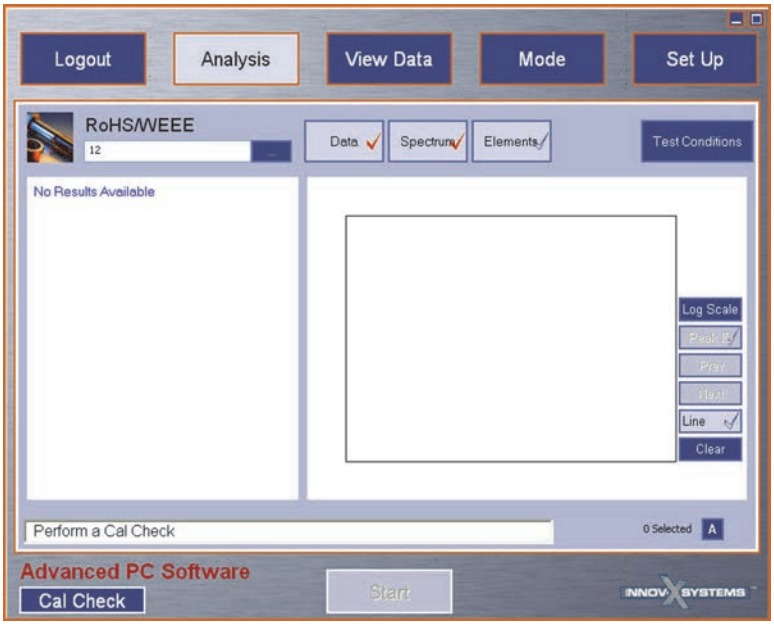


Figure 7-1 The Analysis window

7.1 Before You Begin

Before you begin testing, complete the following steps:

1. On the PC, double-click the DELTA PC Software icon ( )to display the Profile Manager.
2. Connect your DELTA to the computer USB port.
3. Wait until the Windows operating system verifies that your DELTA is connected.
4. In the Profile Manager, verify that the serial number of the connected DELTA and the serial number in the **Connected Instrument SN** box match.
5. If you see a message indicating that the Innov-X software is running on the DELTA, click the **Close Device App** button.

When the application software on the DELTA is closed, control of the DELTA is transferred to the DELTA PC Software.

6. Click **Start** to close the Profile Manager and open the DELTA PC Software **Log In** screen.
7. On the **Log In** screen, type a **User Name** and **Password**, and then click **Login**.
8. Configure the test parameters for the chosen mode using **Set Up**.
9. Verify instrument calibration, or conduct a Cal Check. See "Conducting a Calibration Check" on page 96.

Once these steps are completed, the analyzer is ready for testing.

WARNING

To avoid potential radiation exposure:

- Do not point the analyzer at yourself or another person when testing.
- Do not hold a sample with your fingers or in the palm of your hand when testing.
- Always wear both a ring-style and a badge (either clip-on or lanyard-style) dosimeter.

7.1.1 Conducting a Calibration Check

A calibration check (Cal Check) is a periodic system test, which ensures that the analyzer is functioning within factory specifications. When the status message "Cal Check Required" is present, the analyzer requires a calibration check before testing can proceed.

During a Cal Check, the analyzer collects a spectrum on a known standard (Alloy 316 stainless steel). The analyzer then compares a variety of parameters to factory preset values. When comparisons are within preset tolerances, the analyzer passes Cal Check.

General facts about Cal Check

- A Cal Check is required after 10 hours of operation.
- The Start Test button and analyzer trigger are disabled until a successful Cal Check is achieved.
- You can run a Cal Check at any time (except during a test).
- When a Cal Check is in progress, the X-ray indicator light blinks, the X-ray tube is energized, and the filter wheel is operational.
- A status bar shows a completion percentage for the check.
- The Cal Check procedure takes 15 seconds.

To conduct a Cal Check

1. Navigate to the **Analysis** window (see Figure 7-2 on page 97).
2. Place the supplied Cal Check coupon (316 stainless steel) on a flat surface.

   Or

   Place the supplied Cal Check coupon (316 stainless steel) over the measurement window of the DELTA Work Station. See "DELTA Portable Workstation" on page 151.
3. Position the analyzer measurement window flush over the coupon.

Or

Close cover of the DELTA Work Station. See “DELTA Portable Workstation” on page 151.

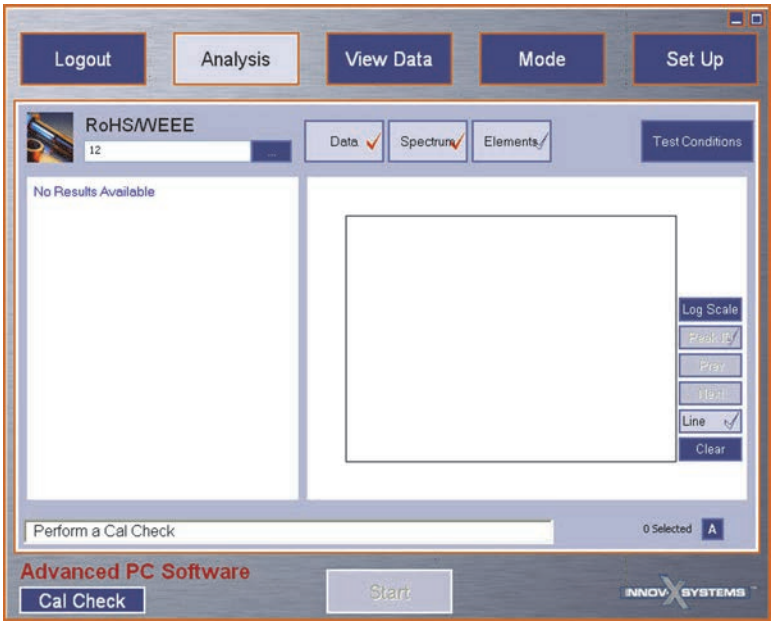


Figure 7-2 The test and test-setup screens – ready for Cal Check procedure

4. Click **Cal Check**.

   The DELTA X-ray indicator light begins blinking to indicate that X-rays are being emitted, and the DELTA PC Software message box displays the progress of the Cal Check.

A Cal Check takes approximately 15 seconds to complete. The **View Data** window displays the status of the test (see Figure 7-3 on page 98).

7.1.2 Troubleshooting a Cal Check

If the Cal Check fails:

- Ensure that the coupon is positioned correctly beneath the measurement window.
- Ensure that the X-ray indicator blinks during the procedure.
- Restart the analyzer
- Retry the Cal Check procedure.

NOTE

If the Cal Check fails repeatedly, contact Olympus customer service or your local distributor.

7.1.3 Conducting a Test

Prior to beginning a testing session, review the Testing Best Practices information at the end of this section (see section 7.2 on page 101).

WARNING

To avoid potential radiation exposure:

- Do not point the analyzer at yourself or another person when testing.
- Do not hold a sample with your fingers or in the palm of your hand when testing.
- Always wear both a ring-style and a badge (either clip-on or lanyard-style) dosimeter.

To conduct a test

1. Navigate to the **Analysis** window (see Figure 7-3 on page 98).

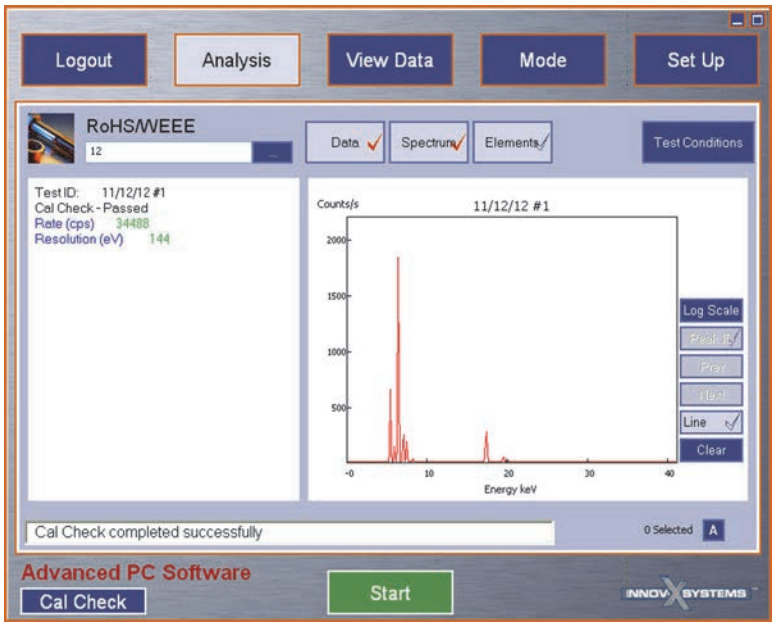


Figure 7-3 The test and test-in-progress screens

2. Position the analyzer measurement window of the over the test sample.
3. Click **Start** to begin testing:
   - The message box shows the progress of the test.
   - Results are displayed immediately upon test completion.

7.1.4 Comparing Grade Match Results (Alloy Modes Only)

In the Alloy modes, it is possible that more than one match can be found for a given test. When this happens, the possible matches are displayed on the screen. To view all of the possible matches, you can use the **Show All** button.

To compare grade match results

1. To view all grade match results arranged side-by-side for better visual comparison, click **Show All** (see Figure 7-4 on page 99), and then click **Spectrum** to deactivate the spectrum display and expand the data display (see Figure 7-5 on page 99).

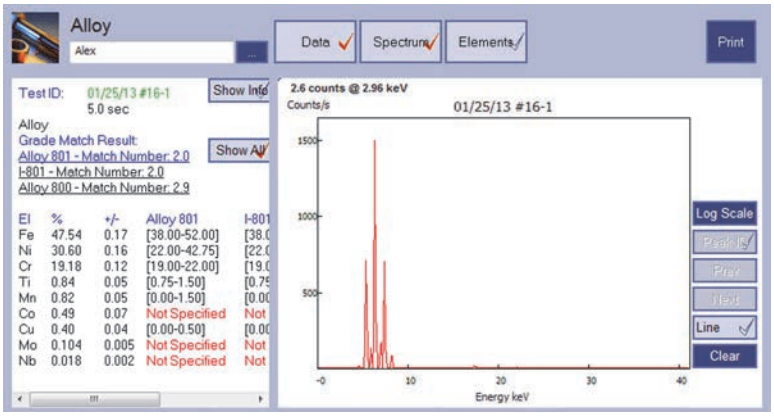


Figure 7-4 Show All enabled

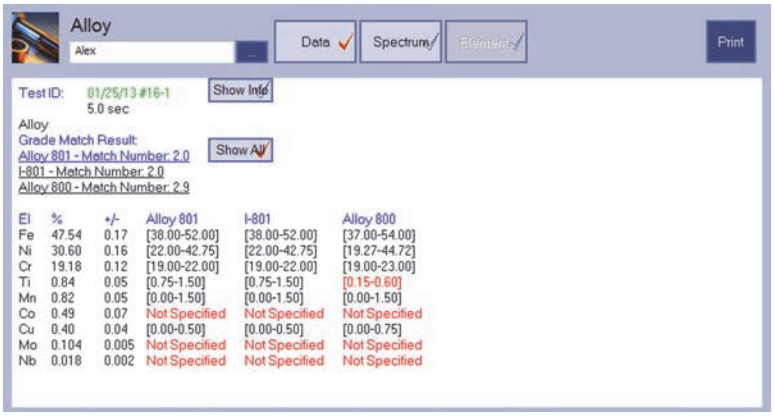


Figure 7-5 Show All enabled and Spectrum display disabled

7.1.5 Displaying Emission Lines

You can display emission lines in the Spectrum display to identify elements.

To display emission lines

1. Make sure that the check mark on the **Spectrum** button is enabled (red).
   The plots for the number of active beams are displayed.
2. Click **Line** to activate the emission line markers for individual elements (see Figure 7-6 on page 100).

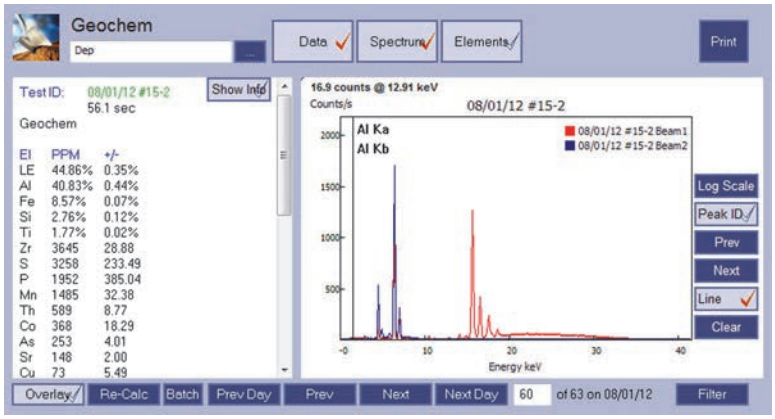


Figure 7-6 The Spectrum display showing emission line markers

The check mark on the **Line** button is red when markers are active.

3. Use the **Next** and **Prev** buttons to move the emission line markers to different elements (see Figure 7-7 on page 100).
4. Click **Peak ID** to display all the spectrum peaks for each element.

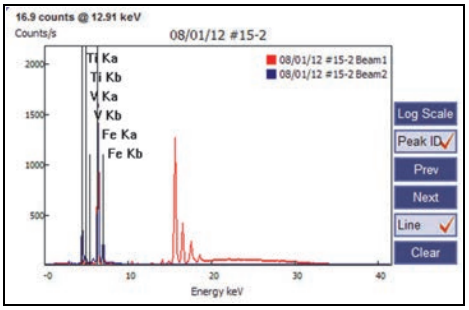


Figure 7-7 The Spectrum display showing Peak ID markers

5. To zoom in on the display, click and drag across the area you want to expand.
   The display is expanded to show the area you selected (see Figure 7-8 on page 100).

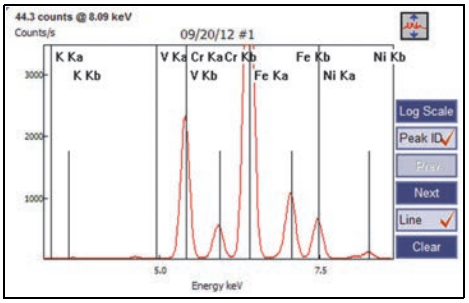


Figure 7-8 An expanded Peak ID display

6. You can further expand the display by canceling the selection of the **Data** button (see Figure 7-9 on page 101).

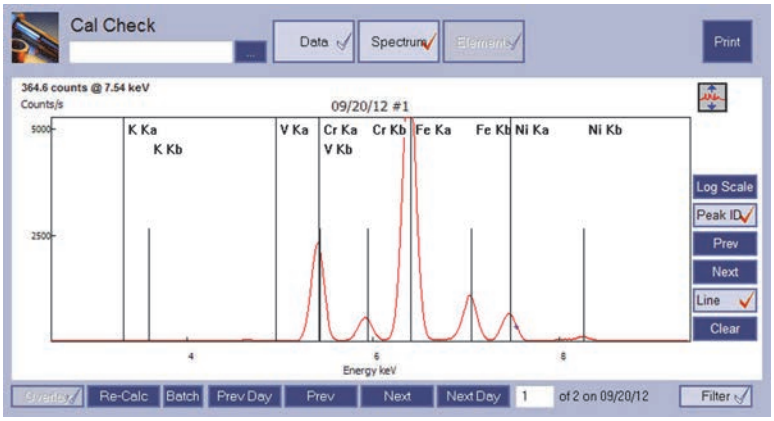


Figure 7-9 A zoomed Spectrum display

7. To set the display back to normal resolution, click the zoom out icon ( ).
8. To select element markers to display on the spectrum, click **Elements** to display the periodic table, and then select the elements for which you want to see markers (see Figure 7-10 on page 101).

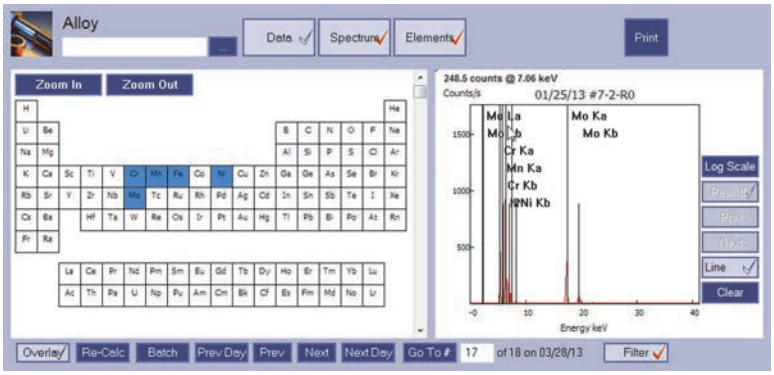


Figure 7-10 Selected elements and their spectral markers

9. Click **Clear** to clear all the markers from the display.
10. To deactivate the emission line markers for individual elements, click **Line**.
    The check mark on the **Line** button is white when markers are deactivated.

7.2 Testing Best Practices

Testing best practices are guidelines for improving test accuracy when testing in various modes.

7.2.1 Alloy Mode

Prior to a test session, you should have an understanding of Olympus's implementation of:

- Grade libraries (see Appendix F on page 137); and,

- Match issues, including the concept and use of match numbers (see "Configuring Match Settings" on page 51).

TIP

Testing tips for Alloy mode:

- Place the analyzer's window on/over the test specimen, cover the window completely.
- Take care not to damage the window film, such as when testing "metal turnings" or hot surfaces.

7.2.2 Mining and Soil Modes

Check Standards

- Measure a check standard after each Cal Check, and periodically throughout the day. Test for a recommended minimum of one minute.
- Use the standards provided with the analyzer. Standards are contained in XRF sample cups. These containers have a window (through which the soil can be viewed) on one side, and a solid cap on the other side.

NOTE

Always measure samples through the sample cup's window.

Sample Presentation

***In situ* testing**

In situ testing is performed by pointing the analyzer at the ground. Clear any grass or large rocks away and hold the analyzer with the front of the probe head flush to the ground. Since dirt can accumulate on the analyzer window, gently wipe the window clean after each analysis. Ensure the window is not ripped or punctured.

Bagged or prepared sample testing

Analyze prepared samples in a sample cup, through its window. Place the analyzer's measurement window directly over the sample cup with the film side up. Preparation considerations include:

- Avoid measuring very thin samples, as this can affect results. Prepare sample cups so that they contain at least 15 mm (usually 4–8 grams) of packed samples.
- When analyzing bagged samples, make sure that there is sufficient sample material in the bag to create a sample thickness of a minimum of 15 mm and that the sample area covers the analyzer's measurement window.
- When using bags, cheaper bags (having thinner plastic walls) are better than more expensive ones (which have thicker plastic walls).

TIP

Testing tips for Mining and Soil modes:

- Place the analyzer's measurement window directly over the sample cup with the film side up.
- Specify the altitude or atmospheric pressure to gain increased accuracy for light elements.
- Confirm that the Testing Time and other parameters are properly selected.
- Take care not to damage the window film, such as when testing uneven surfaces.

7.2.3 Consumer Mode (RoHS)

Check Standards

Measure a check standard after each Cal Check, and periodically throughout the day. Two certified standards are provided for verification.

- At least one standard should be measured for a minimum of two minutes.
- Standards provided are contained in XRF sample cups with a window (through which the plastic pellets can be viewed) on one side, and a solid cap on the other side.
- Samples should be measured in the sample cup, through the window.

Sample Presentation

Since many samples analyzed for RoHS compliance are very small, such as surface-mount components, take care to measure them in a safe and accurate manner.

Consult the IEC 62321 recommendation for minimum thickness of test samples.

TIP

Tips For Consumer mode (RoHS)

In order for XRF testing to be quantitative:

- Use homogeneous samples.
- Make sure samples are of a minimum thickness:
  - 5 mm for polymers and light alloys
  - 15 mm for liquid samples
  - 1 mm for other alloys

If samples are heterogeneous, too thin, or too small, only qualitative screening is possible.

8. View Data

Each test result is individually stored as a record in the DELTA PC Software. A single result or set of results can be easily found, formatted, and displayed in the **View Data** window. Results can also be exported or averaged (refer to "Averaging Test Results" on page 115 for more information).

8.1 Using the View Data window

The **View Data** window allows you to view current test results, navigate to stored results, and export results.

- To display the **View Data** window, click the **View Data** button (see Figure 8-1 on page 105).

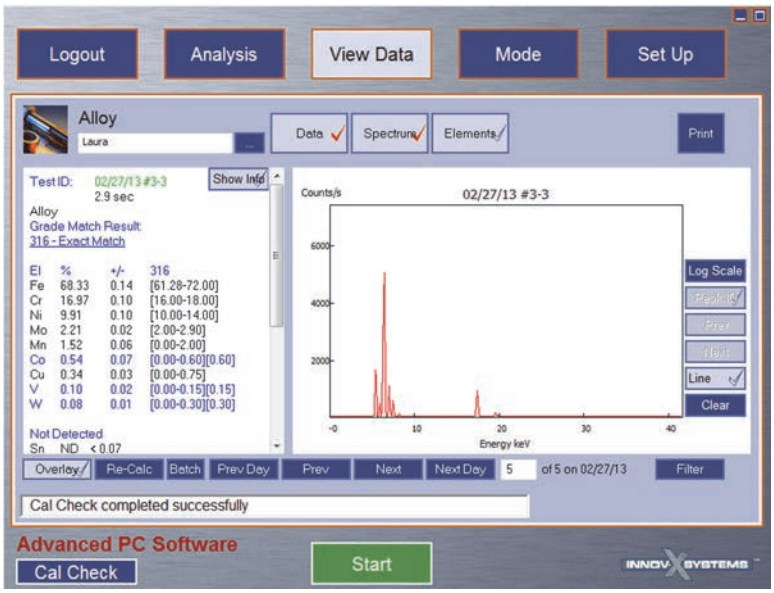


Figure 8-1 The View Data window

To set up display options

1. Click **Prev** or **Next** to scroll through individual results.
2. Click **Prev Day** or **Next Day** to go to results for the previous day or next day.
3. Click **Filter** to filter test results by mode, date range, test info fields, or elemental criteria. See "Search Filter" on page 31 for more information on using the Search Filter.

4. Click the **Data** button to show or hide the data display.
   Note that the data display displaces the elements display.
5. Click the **Spectrum** button to show or hide the spectrum results.
   When the spectrum display is enabled, the following buttons appear to the right of the display:
   - **Lin/Log Scale** – Switches between linear and logarithmic scales.
   - **Peak ID** – Allows you to identify peaks within the spectrum.
   - **Prev** – Displays the previous Peak ID.
   - **Next** – Displays the next Peak ID.
   - **Line** – Allows you to display markers.
   - **Clear** – Clears all markers.
6. Click the **Elements** button to display the periodic table.
7. Click the **Show Info** button to show the **Test Info** field in the data display.

To print test result information

1. To format the report before printing, click **Set Up > Data Management** to display the **Data Management** pane.
2. Click the **Print Setup** tab and choose the elements to include in the report. See "Print Setup Tab" on page 28 for more information.
3. In the **View Data** window, click the **Print** button.

To view Live Average results

- Set up and run the Live Average tests, and then click **View Data** to view the results. See "Live Averaging" on page 115.

To view repeated tests with averaging

- Set up and run the repeated tests, and then click **View Data** to view the results. See "Repeated Tests With Averaging" on page 119.

8.2 Historical Averaging

Historical averaging allows you to select from a list of previous test results, then create an average from your selections.

To enable historical averaging

1. On the **Setup** pane, click **Set Up > Factory Settings > Hardware/Misc Settings** to display the **Hardware/Misc Settings** pane.
2. Under **Misc Settings**, select **Historical Averaging**.
3. Click **Save**.

To set up and use historical averaging

1. Click **View Data** to display the **View Data** window for the currently selected test.
   A gray check button appears for every valid test result (see Figure 8-2 on page 107).

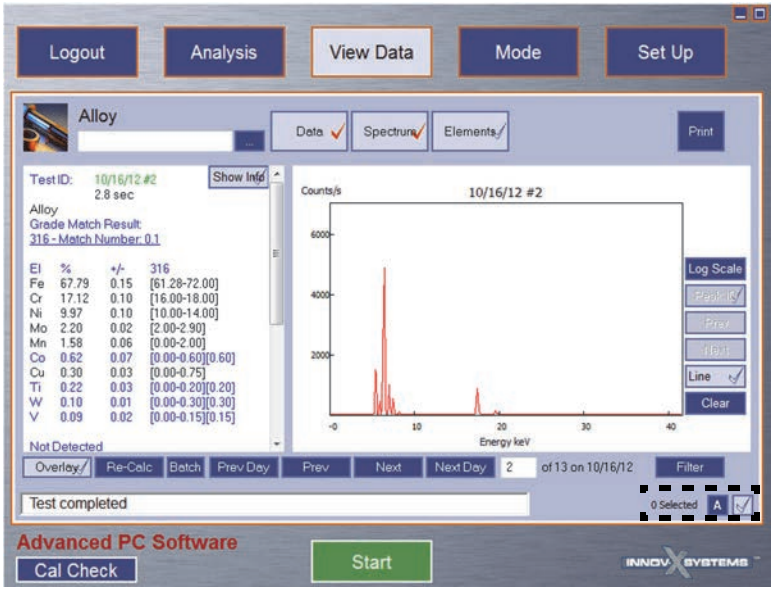


Figure 8-2 The View Data window – Historical averaging available

2. Click the check button ( ) to include the result in the averaging group.
   The check turns red to confirm the test is included. The **nn Selected** indicator increases by one (see Figure 8-3 on page 107).

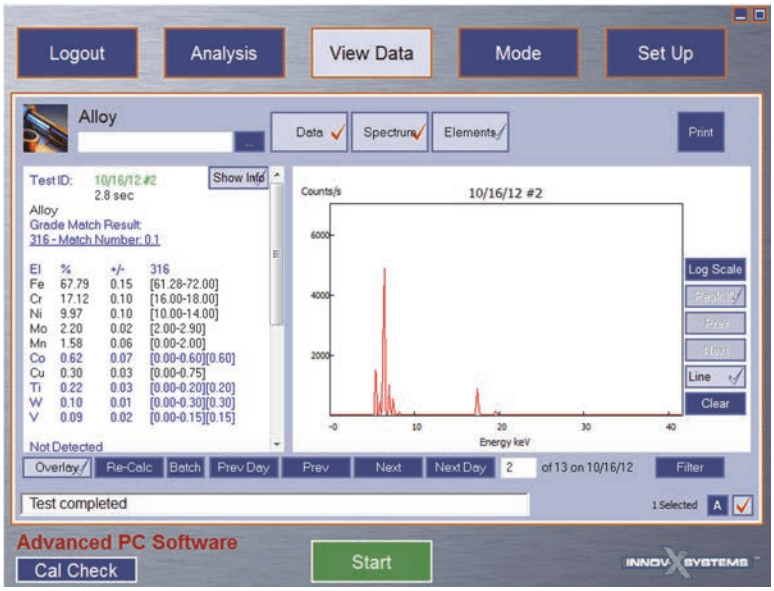


Figure 8-3 Current test record selected

3. Select as many results as necessary. Use the filter to locate a particular result.

4. Click the averaging ( ) button to display the tests selected for averaging in the **Result Groups** dialog box (Figure 8-4 on page 108).

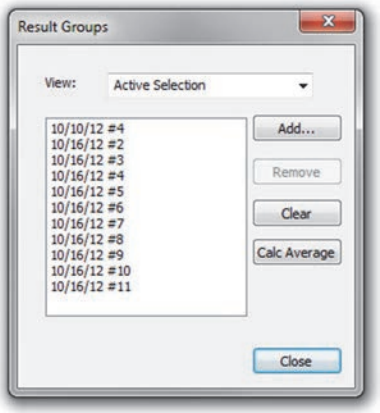


Figure 8-4 The Result Groups dialog box

5. Select **Calc Average** to calculate the average (see Figure 8-5 on page 108).

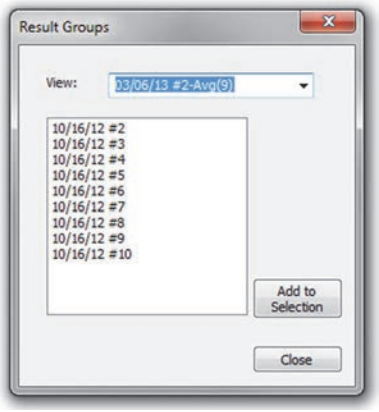


Figure 8-5 The Result Groups dialog box – Calc Average applied

6. Click **Add to Selection**, and then click **Close**.
   The averaged result should be visible on the **Results** pane (see Figure 8-6 on page 109).

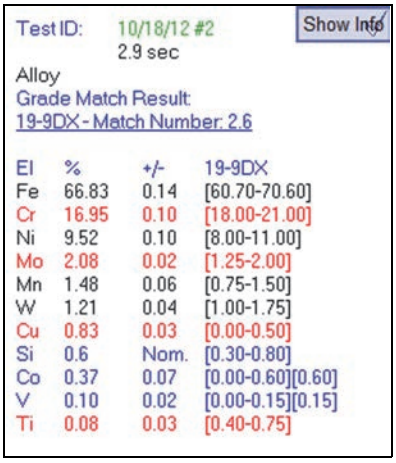


Figure 8-6 Historical average displayed

To add additional results to an average set

1. Select an individual result, and then click the check button ( ) to include the result in the averaging group. Select as many individual results as you want.
2. Click the averaging button (A) to see the original averaging set with the new additions in the **Result Groups** dialog box
3. Click **Calc Average**.
4. Click **Add to Selection**, and then click **Close**.
   The averaged result should be visible on the **Results** pane.

To add a batch of results to an average set

1. Select an individual result, and then click the check button ( ).
2. Click the averaging button (A) to see the result you just chose as the active selection in the **Result Groups** dialog box (see Figure 8-7 on page 110).
3. Select **Add** to display the **Dialog** dialog box.
4. Type a value in the **Number to add** box.
5. Select **Newer** to add newer results or **Older** to add older test results.

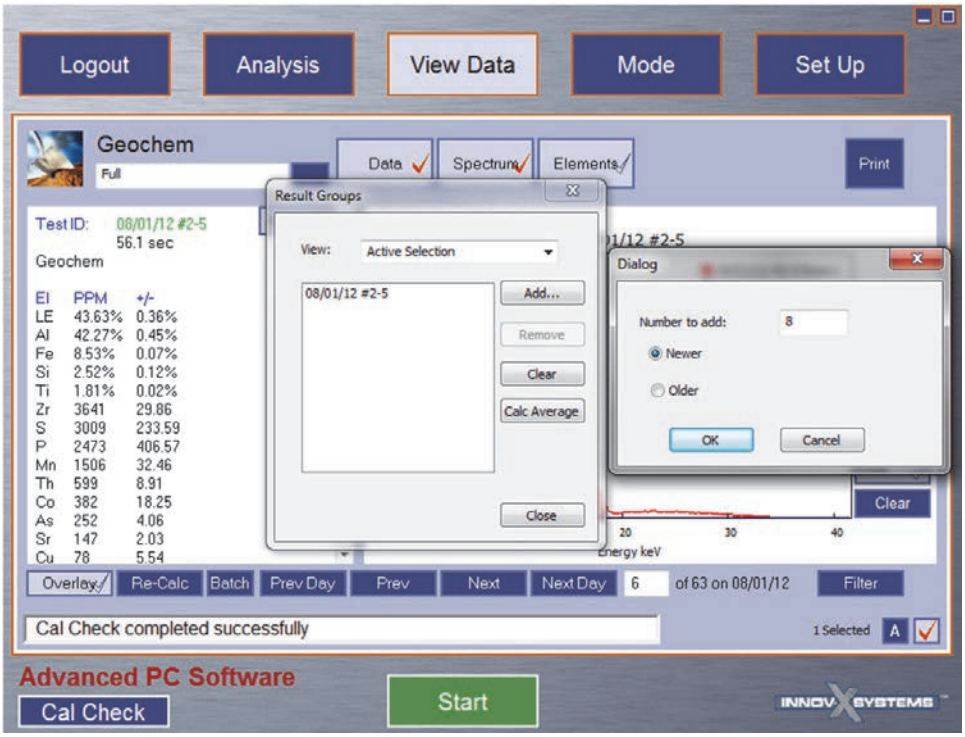


Figure 8-7 Results – Historical selection screens

6. Click **OK**.
   The specified number of newer or older test results are added to the initial result.
7. Click **Calc Average**.
8. Click **Add to Selection**, and then click **Close**.
   The averaged result should be visible on the **View Data** window.

8.3 Regression Testing

The DELTA software allows you to reanalyze past spectra readings against the current calibration, without retesting all samples directly (regression testing). This is useful if you are analyzing large numbers of samples and want to reanalyze those samples after making changes to the calibration. This reanalysis can include multiple spectra.

Regression testing is useful for two primary reasons:

- It saves time, because you only have to run a live test once.
- An instrument or samples may no longer be available for testing. This is especially useful for remote troubleshooting.

The following are several applications of regression testing:

- A User Factor or offset is set for a special application and you want to see results using the new setting.
- A region change or a specific element is added or removed.
- FP n-sigma or percent cutoffs have changed.

- If a calibration shot is discovered to be bad after data are taken, the spectra can be reanalyzed after recalibration.

Circumstances where regression testing is not helpful include:

- Inadequate initial test time
- Problems with sample preparation
- Problems with the DELTA hardware when initial spectrum was acquired
- Instrument firmware upgrade has impacted data collection

To set up regression testing

1. Click **Mode**, and then select a mode.
   Select the applicable **User Factor Set** or **Method**.
2. Make sure the beam settings for the mode are appropriate.
   For example, if reanalyzing readings with a single spectrum from Soil mode beam three, set Soil mode to beam three only.
3. Click **View Data**.
4. Navigate to the reading that you want to rerun.

To run a test

1. Click **Re-Calc** to rerun a single reading.
2. Click **Batch** to display the **Regression Test** dialog box (see Figure 8-8 on page 111).
3. Make sure that **From DB** is selected, and **From Shot Lib** is not selected.

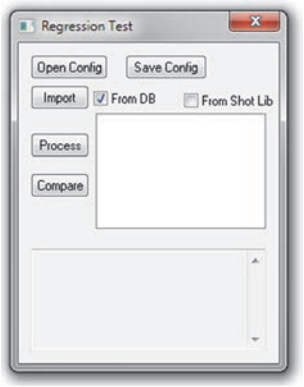


Figure 8-8 The Regression Test dialog box

NOTE

To use regression analysis, readings must be consecutive

4. Click **Import** to display the **Regression Test Selection** dialog box (see Figure 8-9 on page 112).
5. Under **Selecting Tests**, select **From** and **To** values to indicate the readings you want to reanalyze.

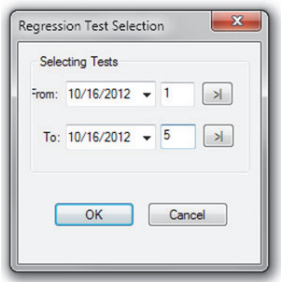


Figure 8-9 The Regression Test Selection dialog box

6. Click **OK** to return to the **Regression Test** dialog box.
   The selected tests are listed.
7. Click **Process** to display the **Regression Setting** dialog box.
8. Select **Save Final Result to DB** (see Figure 8-10 on page 112).
   No need to fill the **Processing Mode** list. If the **Processing Mode** list remains empty, the active mode is used for analysis.

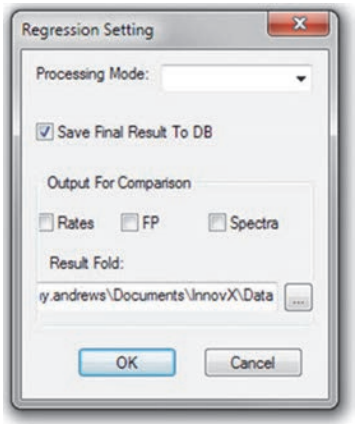


Figure 8-10 The Regression Setting dialog box

9. Click **OK** to return to the **Regression Test** dialog box and begin regression analysis.
   When processing is finished the message, **Processing Complete** is displayed near the bottom of the **Regression Test** dialog box. The results of the analysis are also displayed (see Figure 8-11 on page 113).

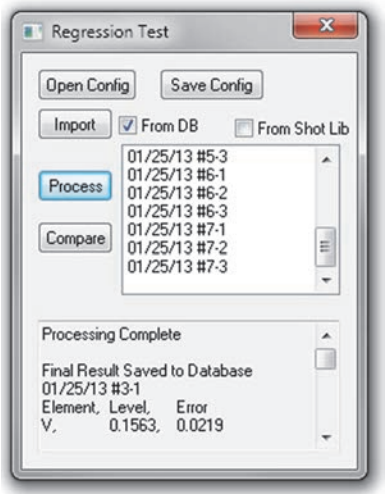


Figure 8-11 The Regression test processing complete

10. Click the close button in the top right corner to close the **Regression Test** dialog box.
11. Click **Next** or **Next Day** to get to the last day of results, and then find the regression results.

    The regression results are identified with "Rn", where the R identifies a regression result and the "n" indicates the regression series. For example, R0 indicates series one of tests (see Figure 8-12 on page 113). The next series would be R1. The third series would be R2, and so forth.

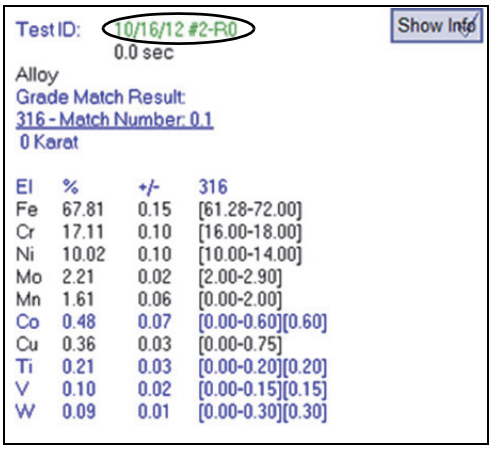


Figure 8-12 Regression results pane

Regression results are saved as normal readings, as if they were taken on the date and time that they were reanalyzed. However, there are a couple differences from normal readings:

- The date and reading number are the same as the original reading.

  Note that the reading itself is saved on the date that it was rerun.
- A rerun result (with "R0") cannot be reanalyzed again. The original result on the original date taken must be reanalyzed

8.4 Spectrum Overlay

Spectrum overlay superimposes one or more spectral displays over a base spectrum. This enables you to compare peaks from one spectrum to another.

To overlay spectrums

1. On the **View Data** window, select **Overlay** (see Figure 8-1 on page 105).
2. Add spectrums from the **Spectrum List** to the **Selected Spectrum** column.
3. Click **Clear** to remove a spectrum from the selected spectrums.

Appendix A: Averaging Test Results

The DELTA handheld XRF analyzer is capable of finding the average of multiple tests. There are three types of averaging available:

- Live averaging
- Historical averaging.
- Repeated tests with averaging

A.1 Live Averaging

Live averaging allows you to create an average using selected multiple tests as you run them.

To enable live averaging

1. On the **Setup** window, click **Set Up > Factory Settings > Hardware/Misc Settings** to display the **Hardware/Misc Settings** pane (see Figure A-1 on page 115).
2. Under **Misc Settings**, select **Live Averaging**.
3. Click **Save**.

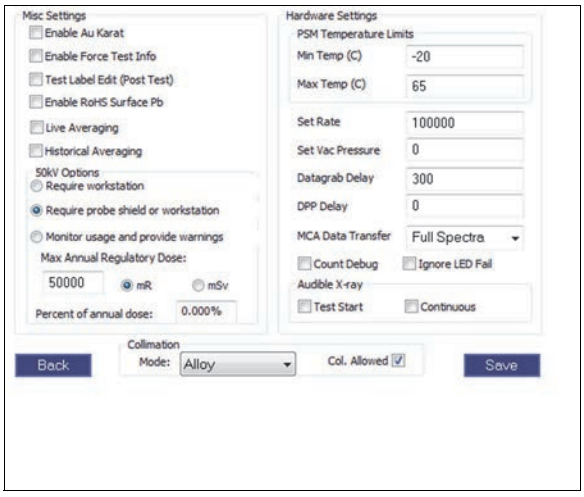


Figure A-1 The Hardware/Misc Settings pane

To set up live averaging

1. Click **Analysis** to display the **Analysis** window for the selected mode (see Figure A-2 on page 116).

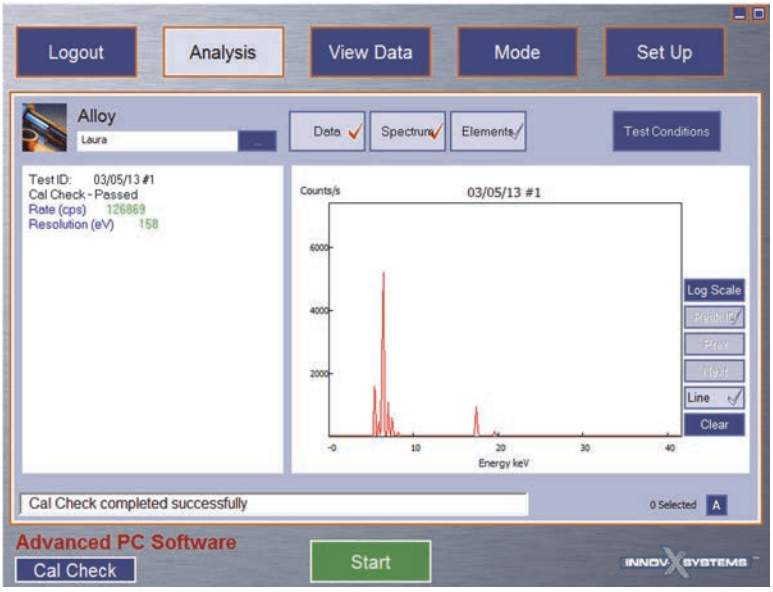


Figure A-2 The Analysis window – averaging icon shown

2. Click the averaging (A) icon to display the **Average Live Setup** dialog box (see Figure A-3 on page 116).
3. Select **Manual Stop**.
4. In the **Required results** box, type the number of results required before calculating the average.

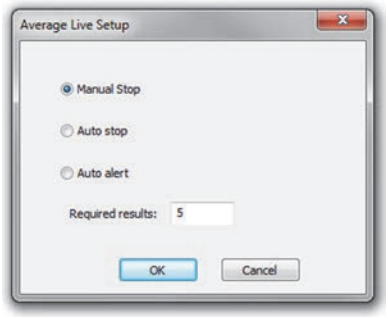


Figure A-3 The Average Live Setup window

5. Click **OK**.

   The averaging icon is now red, indicating that live averaging is active (see Figure A-4 on page 117).

   Note that the **nn Selected** indicator shows the number of tests currently selected for live averaging.

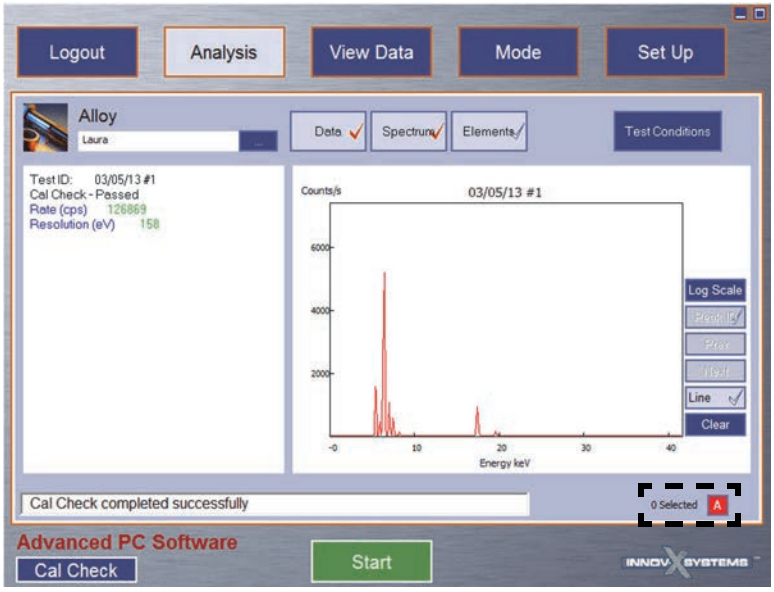


Figure A-4 The Analysis window – Live Averaging enabled

To use live averaging

WARNING

To avoid potential radiation exposure:

- Do not point the analyzer at yourself or another person when testing.
- Do not hold a sample with your fingers or in the palm of your hand when testing.
- Always wear both a ring-style and a badge (either clip-on or lanyard-style) dosimeter.

1. Initiate a test on an appropriate sample. See “Analysis” on page 95 for more information.

   When the test is finished, a red check icon ( ) is displayed (beside the averaging icon) to indicate that the most recent test is selected for averaging (see Figure A-5 on page 118). This is verified by the **nn Selected** indicator.

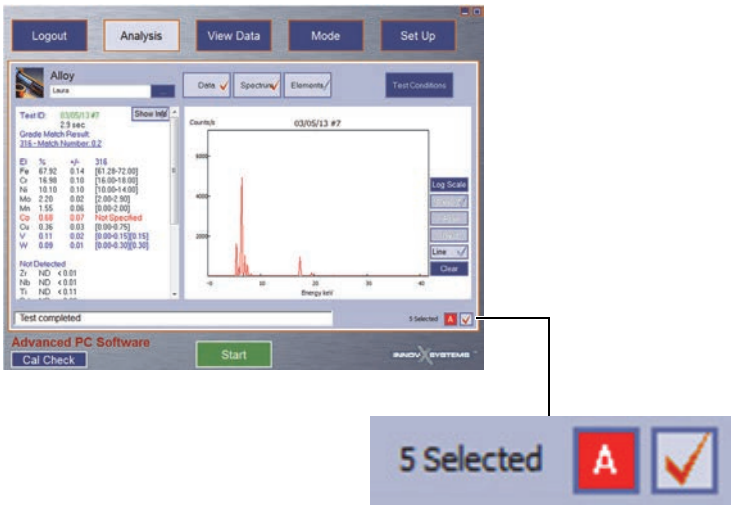


Figure A-5 The current test selected (total of five selected)

2. To exclude the last test from averaging, click the red check icon.
   The check turns gray, and the **nn Selected** field decreases by one (see Figure A-6 on page 118).

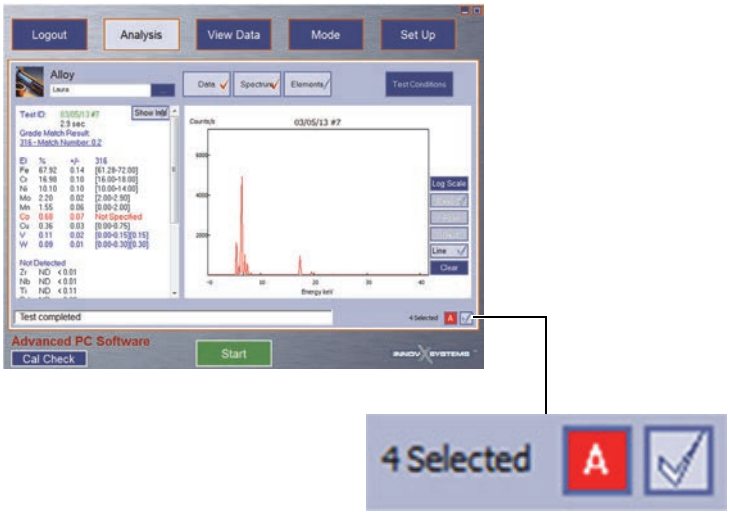


Figure A-6 The current test selection canceled

NOTE

Only the last test run can be excluded from the average. Once two or more consecutive tests have been run, you are only able to edit the last test in the series.

3. Run as many tests as necessary to acquire the required number of tests to begin averaging.

4. Click the averaging icon () to generate the average and display the data in the **View Data** window (see Figure A-7 on page 119).

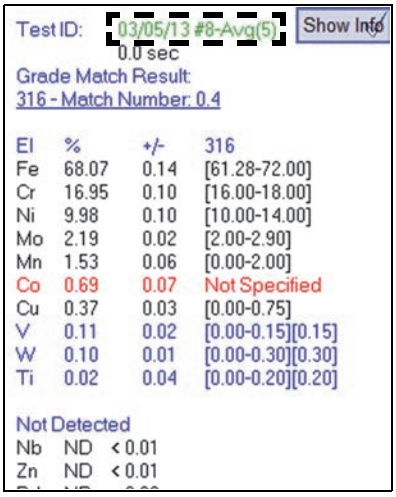


Figure A-7 The View Data window – Live Averaging results pane

A.2 Historical Averaging

Historical averaging allows you to select from a list of previous test results, and use them to generate an average from your selections.

To enable historical averaging

1. On the **Setup** window, click **Set Up > Factory Settings > Hardware/Misc Settings** to display the **Hardware/Misc Settings** pane (see Figure A-1 on page 115).
2. Under **Misc Settings**, select **Historical Averaging**.
3. Click **Save**.

For information on using historical averaging, see “Historical Averaging” on page 106.

A.3 Repeated Tests With Averaging

NOTE

Live averaging must be disabled in **Setup > Factory Settings** before repeated tests with averaging can be run.

When the repeated tests with averaging function is enabled, the test is repeated a configured number of times. Then, the DELTA PC Software automatically creates an average using every test in the sequence to calculate the average.

Example:

```
2-1, 2-2, 2-3, 2-4, 2-5, 2-Avg
```

In the example sequence above, test number 2 (first digit) is repeated 5 times (second digit), then the average of the five tests is calculated.

To generate repeated tests with averaging

WARNING

To avoid potential radiation exposure:

- Do not point the analyzer at yourself or another person when testing.
- Do not hold a sample with your fingers or in the palm of your hand when testing.
- Always wear both a ring-style and a badge (either clip-on or lanyard-style) dosimeter.

1. Click **Mode**, and then select a mode.
2. Click **Set Up > Test Condition** to display the **Test Condition** pane.
3. Select the **Test Time** tab (see Figure A-8 on page 120).
4. Type the number of tests in the **Repeat Test** box.
5. Select the **Generate Avg** check box.
6. Click **Save**.

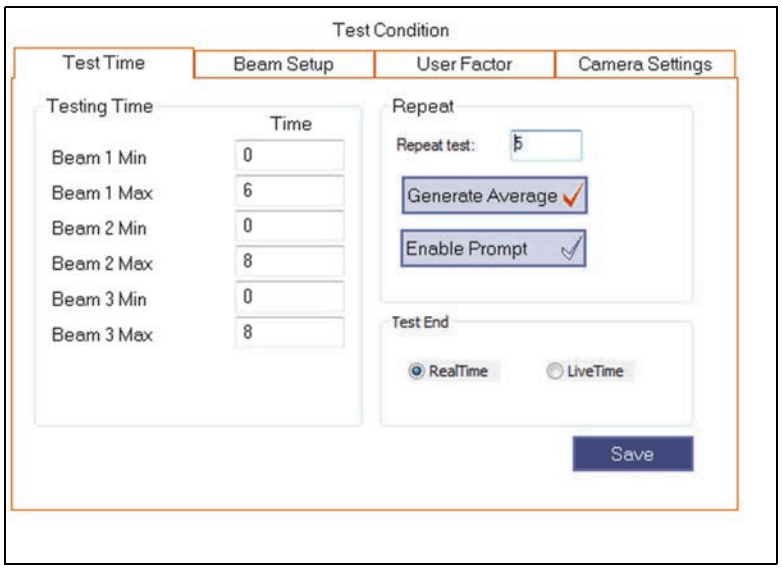


Figure A-8 The Test Time tab – Repeat setup

7. Click **Analysis** (at the top of the window).
8. Click **Start** to initiate and repeat a test until the specified number of tests are completed.
9. Click **View Data** to display the average of the repeated tests (see Figure A-9 on page 121).

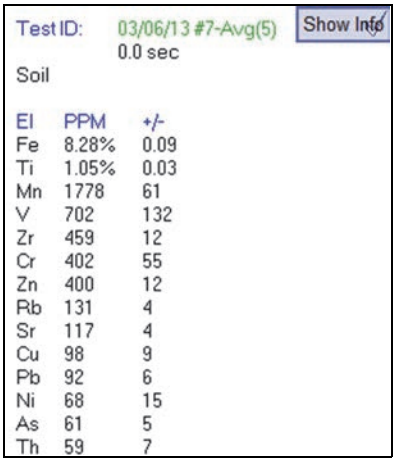


Figure A-9 The View Data window – Test ID pane

Appendix B: Trending Example

Trending allows you to compare and display the analytical accuracy of individual elements across multiple test results. For information on setting up Trending, see "Trending Setup" on page 40.

Trending always uses existing results, and can be set up before or after the test results have been created. The trending graph is viewed in the **View Data** window. A typical use of trending is described in this section. Note that this is only one example out of a wide range of possibilities.

To perform trending

1. On the **Mode** window, select a mode (in this example, Soil is selected).
2. Click **Set Up**, and then click the **Customize Display** icon () to display the **Custom Display** pane.
3. Click **Trending Setup** to display the **Trending** pane.
4. Click **Setup** to go to the **Trending Filter** pane.
5. Select a filter, and then use the current day to set the **From** and **To** dates.
6. Click **Save**, to return to the **Trending** pane.
7. Select the elements of interest (**Mn** and **Ti** in this example) and move them to the **Included** column.
8. Click **Save** to save your selections and display the **View Data** window.
9. Click **Trending** to display the trending graph (see Figure B-1 on page 123).

   A key to the selected elements (Mn and Ti) is shown in the upper-right corner of the pane. The currently selected element (Mn) is identified in the upper-left corner of the pane.

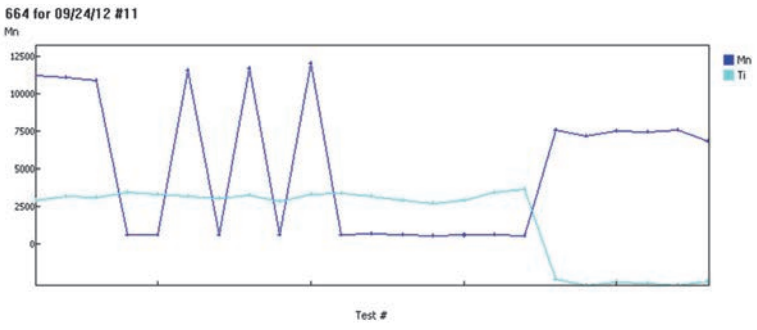


Figure B-1 The Trending graph

10. Click on a plot point to select that section.

    The detected level, test date, and test number for the section are displayed at the top of the pane.

11. To zoom in on a sector of the graph, click and drag on the graph to define the zoom area.

    The magnified segment of the graph is displayed, and the zoom icon ( ) indicates that you are viewing a magnified image (see Figure B-2 on page 124).

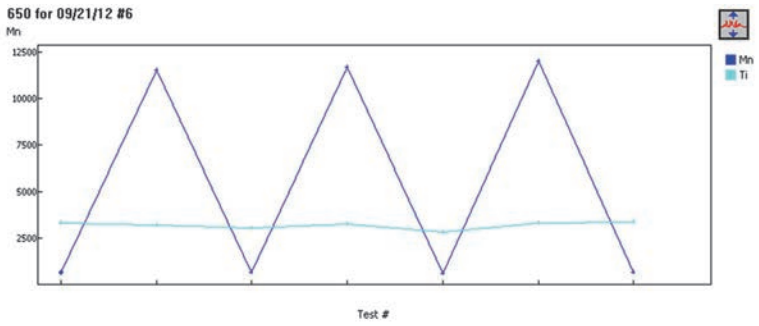


Figure B-2 The Trending graph – magnified view

12. Click the zoom icon to restore the normal view.

NOTE

If using test label filters to create a trending graph of specific tests, you can change the test labels template after gathering the required trending test results for a specific date. The trending data is not altered when additional tests are run.

Appendix C: User Factors

C.1 Definition

User Factors are a stored set of scalar multipliers and offsets that are applied directly to factory calibrated results, before they are displayed. Therefore, the information on the **Analysis** window has been corrected by the User Factor. This is typically done to correct for matrix effects.

C.2 Purpose

User Factors provide two key benefits:

- You can make linear slope and offset calibration corrections without altering factory calibrations.
- You can store multiple slope and offset calibration factor sets.

C.3 Applicable Modes

User Factor correction techniques can be applied for the following modes:

- Mining
- Mining Plus (2-Beam Mining)
- Geochem
- Soil (3-Beam Soil)
- Filter
- Dust Wipe

C.4 Calculating New RoHS/WEEE Factors and Offsets

Prior to accessing the **User Factors** data entry screens, generate correction factors for the element(s) of interest. To generate correction factors, use a linear fit equation that is created from elemental assayed values and corresponding XRF results.

The procedure is shown below in the cadmium example.

This example shows how to apply User Factor techniques to adjust for cadmium in laboratory assayed samples.

Example: cadmium for testing in RoHS/WEEE mode

1. Gather known assayed Cd samples.
2. Record their assayed values in a three column table
3. Test the corresponding samples with your DELTA XRF analyzer.
4. Record the XRF results in the table. Multiple tests of each sample are recommended.
5. Plot the data using Excel or other data analysis software to create a linear trendline.

   See Figure C-1 on page 126 and Table 4 on page 126.

   In this example, the XRF data is consistently higher than the assay by about 1.7 times.

   From the linear fit equation, the value 0.5888 (say 0.59) is the "factor" that can be multiplied by the XRF result to get a close match to the assayed value.

   The offset value (0.1055) is small enough to be disregarded.

Go to section C.5 on page 127 to see the data entry sequence.

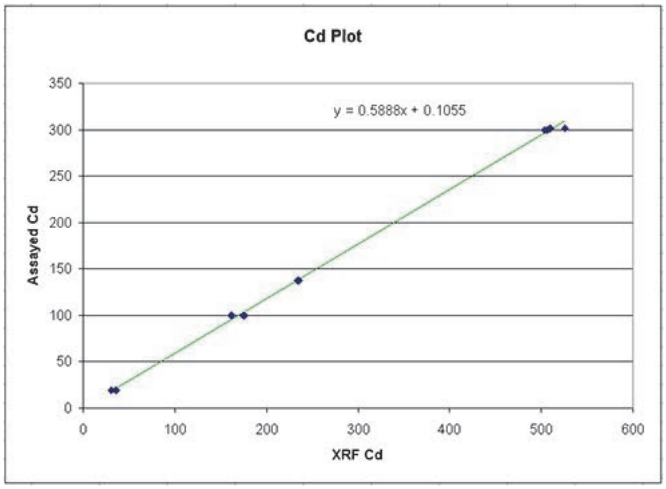


Figure C-1 A sample plot of XRF and assayed values for Cd

Table 4 A sample table of XRF and assayed values for Cd

Sample #	XRF Cd	Assayed Cd
1	31	19.6
1	35	19.6
1	36	19.6
2	236	137
2	235	137
2	234	137
3	504	300
3	504	300

Table 4 A sample table of XRF and assayed values for Cd *(continued)*

Sample #	XRF Cd	Assayed Cd
3	506	300
4	175	100
4	174	100
4	176	100
5	510	301
5	526	301
5	509	301
6	162	100
6	161	100
6	162	100

C.5 Software Operation

Once the factors and offsets (if required) are established, use this sequence to apply them.

To set User Factors

1. Select the appropriate mode, and then click **Set Up**.
2. On the **Set Up** window, click **Test Condition**.
3. On the **User Factor** tab, click **Add** (see Figure C-2 on page 127).
4. Click the **Name** box to name the selected factor.
5. Using the scroll bar, select an element of interest.

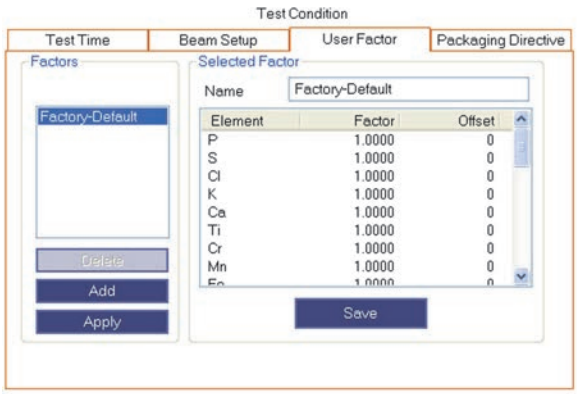


Figure C-2 The User Factor tab (RoHS/WEEE)

6. Enter **Factor** and **Offset** values for that element.

7. Continue selecting elements and setting factor and offset values for each remaining element of interest.
8. Click **Save** to save your changes.
9. Select a factor set and click **Apply** to use the factors in your testing.

To create a new User Factor model

1. On the **User Factor** tab, click **Add** (see Figure C-2 on page 127).
2. Under **Selected Factor**, select the name of the new factor.
3. In the **Name** box, type the new model name and click **Save**.
4. Using the scroll bar, select an element of interest.
5. Enter **Factor** and **Offset** values for that element.
6. Continue selecting elements and setting factor and offset values for each remaining element of interest.
7. Click **Save** to save your changes.

TIP

Consider whether offsets are necessary for a given calibration. In many cases, only adjustment of the User Factor is needed.

To determine an offset, use a minimum of three separate standards, and ensure that the lowest concentration value is <20 % of the highest concentration value.

A User Factor plot can also be produced by placing assay results on the x-axis and XRF results on the x-axis. Make sure that the plot slope and offset are correctly converted to Slope and Offset.

To apply User Factor set model

- Under **Factors**, select the User Factor set model, and then click **Apply**.

  The selected model is displayed at the top of the pane and this User Factor set is ready to be applied to XRF test results.

C.6 Determining Correction Factors

Correction factors are determined using one of three types of calibration (single point, multi-point with no offset, or multi-point with offset):

- **Single Point Calibration**

  Determine the ratio of XRF result to known values, then divide the current factor by this ratio to determine the new element factor.

- **Multi-Point Calibration with No Offset**

  The results are exported and plotted against known values using Excel or other data analysis software. A linear equation with slope and intercept (if necessary) is determined from the plot.

  $$Y = mX$$

  XRF response is plotted on the x-axis and the assayed value plotted on the y-axis. Factor = m if the original factor = −1.

- **Multi-Point Calibration with Offset**

  The results are exported and plotted against known values using Excel or other data analysis software. A linear equation with slope and intercept is determined from the plot.

  $$Y = mX + b$$

  Take initial data in the "factory-default" User Factor set of factor = 1, offset = 0.

  XRF response is plotted on the x-axis and the assayed value plotted on the y-axis. Factor = m and the offset = b.

Appendix D: RoHS/WEEE Analysis

D.1 Background

Toxic metals in consumer electronics are the focus of EU regulations that have worldwide ramifications. These new directives currently include:

- Restriction of Hazardous Substances (2013-08-08: RoHS)

  Designates maximum allowable levels of Pb, Cd, Cr^{6+}, Hg, and certain Br-containing flame retardants (PBB and PBDE) in new electrical and electronic equipment sold into the EU.
- Waste Electrical/Electronic Equipment Directive (WEEE)

  Requires separate collection and recycling of WEEE, some of which may contain hazardous substances.

The limits for RoHS elements are:

- <0. 1 % Pb, Cr^{6+}, Hg, Br (as flame retardants, PBB and PBDE)
- <0.01 % Cd
- Additionally, many other regulations and voluntary standards have been enacted worldwide that restrict elemental content in consumer products.

The Olympus analyzer is a screening tool for RoHS compliance. It is used to:

- Directly analyze the amount of toxic metals in electronics; and,
- Quickly identify whether a plastic is made of or contains:
  - PVC
  - A brominated flame retardant.

XRF measures total elemental composition, regardless of speciation of the element. Therefore, it reports:

- Total chromium including the concentration of hexavalent chromium plus any other forms of Cr; and,
- Total bromine; however, XRF cannot distinguish the type of brominated flame retardant present in analyzed materials.

In order for XRF to be quantitative, samples must:

- Be homogeneous
- Match the matrix type of the calibration used (e.g. polymer, alloy, etc.)
- Have a certain minimum sample thickness
  - 5 mm for polymers and light alloys

— 15 mm for liquid samples
— 1 mm for other alloys

If samples are heterogeneous, too thin, or too small, only qualitative screening is possible.

The IEC-ACEA (International Electro-technical Commission — Advisory Committee on Environmental Aspects) and many other regulatory bodies recommend XRF screening.

D.2 Software Overview

The DELTA handheld XRF analyzer in RoHS/WEEE mode automatically executes a test sequence to make the following determinations:

- Whether a sample is an alloy, polymer, or mixed sample.

  Mixed indicates heterogeneous samples consisting of both polymer and alloy, such as wires or circuit boards.
- Whether each RoHS element passes, fails, or is inconclusive when compared to a set of stored criteria.

  These criteria are either those recommended by the IEC, or ones added by the user.

The sequence begins with the instrument utilizing settings appropriate for analyzing a polymer sample. Then, the following logic is applied:

- If the sample is determined to be a polymer or mixed, the test continues, and a calibration based on a polymer matrix is used.
- If the sample is found to be a metal alloy, the analyzer switches to a secondary test, using an alloy matrix calibration, in order to determine correct alloy concentrations.

Sample Presentation

Since many pieces of plastic analyzed for RoHS/WEEE compliance are very small, take care to measure them in a safe and accurate manner. Refer to the IEC-ACEA recommendations for the minimum thickness of test samples.

When the minimum thickness cannot be met with a single sample, multiple identical samples can be stacked or layered to increase effective thickness. XRF sample cups (commonly used for soil testing) can be useful for testing many small samples together, such as surface mount components.

D.3 IEC Quantitative Screening Requirements

RoHS screening requirements are derived from the *Directive 2011/65/EU of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment,* dated 8 June 2011. This document is a recast of the original directive 2002/95/EC, dated 27 January 2003.

IEC Screening Guidelines below are adapted from an example screening scheme in IEC 62321 – *Electrotechnical products – Determination of levels of six regulated substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers)* Ed. 1.0, dated December 2008.

Important Current Issues

CAUTION

Screening guidelines are given as an example scheme based on RoHS action levels. The inconclusive band around the action level is based on risk assessment, and is an example of an “uncertainty budget”.

Screening guidelines may vary based on the sample types tested and a user’s tolerance for risk. Following these screening guidelines alone may not be sufficient to ensure that a proper compliance determination is made.

Olympus strongly advises users to have their own compliance departments determine appropriate screening guidelines, test methodology, standard operating procedure, and the current status of the requirements that they must meet.

D.4 Grade Definitions for Screening

Table 5 Grade definitions

Grade	Proposed screening criteria
Pass	Results for ALL elements are lower than the lower limits shown (see Table 6 on page 134).
Fail	Result for ANY element higher than the higher limits shown (see Table 6 on page 134).
Inconclusive	Result of the quantitative analysis, for any of the elements Hg, Pb, or Cd, is in the region defined as intermediate, OR if the result of the elements BR and Cr is higher than the higher limits shown (see Table 6 on page 134), the analysis is inconclusive. Additional investigation must be performed.

D.5 Screening Limits for RoHS/WEEE Compliance

Table 6 Example of screening limits for RoHS elements

RoHS Elements	Pass	Lower Limit	Inconclusive	Upper Limit	Fail
Cd	P	≤(70 – 3σ)	< X <	(130 + 3σ)≤	F
Pb	P	≤(700 – 3σ)	< X <	(1300 + 3σ)≤	F
Hg	P	≤(700 – 3σ)	< X <	(1300 + 3σ)≤	F
Br	P	≤(300 – 3σ)<	X	—	—
Cr	P	≤(700 – 3σ)<	X	—	—
Metallic materials					
Cd	P	≤(70 – 3σ)	< X <	(130 + 3σ)≤	F
Pb	P	≤(700 – 3σ)	< X <	(1300 + 3σ)≤	F
Hg	P	≤(700 – 3σ)	< X <	(1300 + 3σ)≤	F
Br			N/A	—	—
Cr	P	≤(700 – 3σ)<	X	—	—
Electronics					
Cd	P	LOD	< X <	(150 + 3σ)≤	F
Pb	P	≤(500 – 3σ)	< X <	(1500 + 3σ)≤	F
Hg	P	≤(500 – 3σ)	< X <	(1500 + 3σ)≤	F
Br	P	≤(250 – 3σ)<	X	—	—
Cr	P	≤(500 – 3σ)<	X	—	—

Appendix E: Test Time Notes

E.1 Background

Test times for DELTA handheld XRF analyzers are a function of several items, including:

- User chosen mode
- Desired precision
- Desired result speed or throughput time (a trade-off with precision)

Other technical design factors can include:

- X-ray producing hardware/electronics including type of detector
- Software and processor sophistication

A key difference for DELTA instrument models is the type of detector:

- Classic and Classic Plus — PIN diode
- Standard, Professional, Premium, and Premium Plus — Silicon Drift Detector (SDD)

SDD-based units have much faster processing response times as compared to the PIN units.

E.2 Testing Time Issues — All Modes

- *Min. testing time* is the interval that must elapse before results are calculated.
  Results do not appear until the min. testing time has elapsed.
- If a test is stopped before the min. testing time has elapsed, the test is aborted.
  - — No results are calculated.
  - — No information related to the test is saved.
- *Max. testing time* automatically ends the test at a preset testing interval.
  It may be two minutes (or more) depending on detection limits and desired precision.

Alloy Comments

For most alloys, to obtain a unique grade ID and good alloy chemistry, the recommended testing time is 5 to 10 seconds.

For some alloys that only differ by small amounts of one or two elements, it may be necessary to perform longer tests. Examples include low alloy steels 4140 and 4340, and aluminum alloys 6063 and 1100.

In Alloy mode, for separation of alloys which differ by less than 1 % of Ti or V, QuickSort is recommended as the SmartBeam option.

In Alloy Plus mode, for separation of alloys which differ by presence or concentration of light elements, SmartSort is recommended as the Alloy Plus option.

The maximum testing time determines the length of a test. The analysis automatically stops if the maximum testing time is reached. Normal maximum testing times range from 5 to 20 seconds, though longer times may be needed for beam 2 of Alloy Plus mode.

E.3 Alloy Analysis Goals

In general, use test times suitable for your alloy analysis goals:

- If your analysis goal is primarily grade identification, shorter test times may be sufficient.
- If your analysis goal requires greater accuracy, longer test times may increase precision.

Appendix F: Alloy Grade Libraries

Every DELTA handheld XRF analyzer is supplied with four libraries:

- The Factory library unique to every model (see the following pages for tables showing model/factory grade names).
- The Tramp library.
- User library #1 (the user can store over 500 grade names).
- User library #2 (the user can store over 500 grade names).

CAUTION

Editing the Factory Grade Library could be detrimental to the accuracy and functionality of the analyzer. Editing the Factory Grade library is not recommended.

F.1 Tramp Library

Every analyzer is shipped with a Tramp library comprised of seven base alloys (see Table 7 on page 138). The Tramp library supports other grade libraries.

Tramp limits can be set, element by element, alloy base by alloy base, to meet specific requirements.

A single click can globally select or clear the Tramp features.

How the Tramp library works

1. Tramp grades are matched to alloy bases rather than specific grades.
   - Each sample is determined to be one of seven possible base alloys (see Table 7 on page 138).
   - The analyzer applies the Tramp grade/base-specific tramp limits from the matching Tramp grade.
2. These Tramp or "alloy-base-specific" limits are applied when an element is detected in a specific grade, and:
   - The nearest grade match has no specification for that element.
   - The concentration of the sample is less than the max limit specified by the matching Tramp grade.
3. Once the conditions for step 2 are met, the element reported:
   - Is displayed in blue;

- Is labeled as a Tramp material in the grade comparison table; and,
- The grade match, however, is not penalized.

Practical Advantages of the Tramp Element Approach

- Faster sorting
- Fewer ambiguous or incorrect matches
- Improved grade library integrity
- Prominent labeling of tramp elements

Table 7 Tramp library base alloys

Base Alloys	Common Tramp Elements
_AlAlloyBase	Pb, Bi, Sn, Fe, Cu, and Zn.
_CoAlloyBase	Al, Ti, V, Cu, Nb, Ta, and Zr.
_CuAlloyBase	S, As, Ag, Sb, and Sn; not as common: Pb, Co, and Ni.
_FeAlloyBase	V, Co, Cu, Ni, and As; sometimes: Si, W, and Nb.
_GenericAlloyBase	V, Co, Cu, Ni, and As; sometimes: Si, W, and Nb.
_NiAlloyBase	V, Co, W, Zr, and Nb; sometimes: Ta, Mo, Cr, and Cu.
_TiAlloyBase	Fe is common; Cu and Si show up at low levels.

F.2 DELTA Classic, Classic Plus, and Inspector Factory Grade Library

Table 8 Aluminum, cobalt alloys, and speciality grades

Aluminum	Cobalt Alloys	Speciality Grades
2007	Alloy 686	60Sn-40Pb
2011	AlnicoVIII	63Sn-37Pb
2018	Cobalt	96-4
2117	Elgiloy	AZ31B
2618	F75	AZ91A or C
4032	FSX-414	SAC 300
5454	Haynes188	SAC 305
6040	Haynes36	SAC 400
6061	HS-1	SAC 405
6070	HS-12	97-3
6253	HS-19	Ag
6262	HS-21	Au

Table 8 Aluminum, cobalt alloys, and speciality grades *(continued)*

Aluminum	Cobalt Alloys	Speciality Grades
7005	HS-25-L605	Bi
7016	HS-31	Cb 103
7019	HS-4	CP Ta
7039	HS-6B	Cr
7050	Jetalloy	Densalloy
7072	MarM302	Hf
7075	MarM509	Mn
7104	MarM905	Mo
1100-plus	MP35N	Nb
2024-plus	MPN159	Ni
2098-2195	Star J	Pb
2219-2519	Ultimet	Pd
3003 or 4 or 5		Re
355-2		Sb
5052-plus		Se
5086-plus		Sn
6063-plus		TungCarb C
7049-149-249		TungCarb S
		V
		W
		Zn
		Zr
		Zr 2 or 4
		Zr 702
		Zr 704
		Zr 705

Table 9 Copper and nickel alloys

Copper Alloys			Nickel Alloys		
C 110	C 510	C 864	B 1900	I-617	MarM421
C 172	C 524	C 867	B-1900 Hf	I-625	Monel400
C 194	C 534	C 868	C-1023	I-690	Monel411

Table 9 Copper and nickel alloys *(continued)*

Copper Alloys			Nickel Alloys		
C 210	C 544	C 875	GMR235	I-700	MonelK500
C 220	C 623	C 8932	GTD222	I-702	MuMetal
C 260	C 630	C 903	Hast BC1	I-706	Ni 200
C 270	C 655	C 922	HastB	I-713	NichromeV
C 310	C 667	C 932	HastB2	I-718	Nim101
C 314	C 673	C 937	HastB3	I-720	Nim263
C 330	C 675	C 955	HastC2000	I-722	Nimonic75
C 332	C 706	C194HiCu	HastC22	I-725	Nimonic80A
C 340	C 710	C197HiCu	HastC276	I-738	Nimonic90
C 342	C 715	Elec Cu	HastC4	I-750	PWA1480
C 360	C 745	Muntz	HastF	I-792	PWA1484
C 377	C 752	NarloyZ	HastG	I-800	RA333
C 425	C 814	SeBiLOYI	HastG2	I-801	Rene125
C 443	C 836	SeBiLOYII	HastG3	I-825	Rene142
C 464	C 857	SeBiLOYIII	HastG30	I-901	Rene220
C 482			HastN	I-903	Rene41
C 485			HastR	I-907-909	Rene77
			HastS	I-939	Rene80
			HastW	IN100Mar	Rene95
			HastX	M002	Supertherm
			Haynes230	MarM200	Udimet500
			HR160	MarM246	Udimet520
			HyMu80	MarM247	Udimet700
			I-102I-49		Waspaloy
			I-600		
			I-601		

Table 10 Low-alloy and chrome-moly steels

Low-Alloy Steels	Chrome-Moly Steels
3310	1 1-4 Cr
4130	2 1-4 Cr
4140	5 Cr

Table 10 Low-alloy and chrome-moly steels *(continued)*

Low-Alloy Steels	Chrome-Moly Steels
4340	9 Cr
8620	P91
9310	
12L14	
A10	
Carb 1-2 Moly	
Carbon Steel	
20Mo4	

Table 11 Stainless, Ti, and Tool steels

Stainless Grades			Ti Grades	Tool Steels
201	21-6-9	Haynes556	Cp Ti	A2
203	25-4-4	Incoloy840	Cp Ti Pd	A6
304	254SMO	Invar 36	Ti 12	A7
309	26-1	Kovar	Ti 17	D2 or D4
310	29-4	M152	Ti 3 2-5	D7
316	29-4-2	Maraging350	Ti 6-22-22	H-11
317	29-4C	MaragingC200	Ti 6-2-4-2	M1
321	302HQ	MaragingC250	Ti 6-2-4-6	M2
329	410 Cb	MaragingC300	Ti 6-4	M4
330	410-16-20	N-155	Ti 6-6-2	M42
347	904L	Ni-hard#1	Ti 8	O1
422	A-286	Ni-hard#4	Ti 8-1-1	O2
430	AL6XN	Ni-Span902	Ti 10-2-3	O6
431	Alloy42	Nitronic40	Ti 15-3-3-3	S1
434	AlnicoII	Nitronic50	Ti 3-11-13	S5
440	AlnicoIII	Nitronic60	Ti 5 - 2-5	S6
441	AlnicoV	RA330	Ti 6-2-1-1	S7
446	AMS350	RA85H	TiBetaC	T1
2003	AMS355	Zeron100		
2101	CD4MCU			
2507	Custom450			

Table 11 Stainless, Ti, and Tool steels *(continued)*

Stainless Grades			Ti Grades	Tool Steels
13-8 Mo	Custom455			
15-5 PH	Duplex2205			
15Mn7Cr	E-bite			
17-4 PH	Ferallium255			
17-7 PH	GreekAscoloy			
19-9DL	H12			
19-9DX	H13			
20Cb3				
20Mo6				

F.3 DELTA Standard and Professional Factory Grade Library

Table 12 Aluminum, cobalt alloys, and speciality grades

Aluminum	Cobalt Alloys	Speciality Grades
319	Alloy 686	60Sn-40Pb
333	AlnicoVIII	63Sn-37Pb
380	Cobalt	96-4
383	Elgiloy	AZ31B
384	F75	AZ91A or C
2007	FSX-414	SAC 300
2011	Haynes188	SAC 305
2018	Haynes36	SAC 400
2024	HS-1	SAC 405
2117	HS-12	97-3
2618	HS-19	Ag
3004	HS-21	Au
4032	HS25-L605	Bi
5042	HS-31	Cb 103
5052	HS-4	CP Ta
5083	HS-6B	Cr
5086	Jetalloy	Densalloy
5154	MarM302	Hf

Table 12 Aluminum, cobalt alloys, and speciality grades *(continued)*

Aluminum	Cobalt Alloys	Speciality Grades
5454	MarM509	Mn
6040	MarM905	Mo
6061	MP35N	Nb
6070	MPN159	Ni
6253	Star J	Pb
6262	Ultimet	Pd
7005		Re
7016		Sb
7019		Se
7039		Sn
7050		TungCarb C
7072		TungCarb S
7075		V
7104		W
1100-plus		Zn
2014-17 std		Zr
2024-plus		Zr 2 or 4
2098-2195		Zr 702
2219-2519		Zr 704
3003 or 4 or 5		Zr 705
3003 or 5		
355-2		
356-57-std		
5052-plus		
5056-82		
5086-plus		
6063-plus		
7049-149-249		

Table 13 Copper and nickel alloys

Copper Alloys			Nickel Alloys		
C 110	C 510	C 864	20Mo4	I-102	MarM247
C 172	C 524	C 867	B 1900	I-49	MarM421
C 194	C 534	C 868	B-1900 Hf	I-600	Monel400
C 210	C 544	C 875	C-1023	I-601	Monel411
C 220	C 623	C 8932	Colmonoy 6	I-602	MonelK500
C 260	C 630	C 903	GMR235	I-617	MuMetal
C 270	C 655	C 922	GTD222	I-625	Ni 200
C 310	C 667	C 932	Hast BC1	I-690	NichromeV
C 314	C 673	C 937	HastB	I-700	Nim101
C 330	C 675	C 955	HastB2	I-702	Nim263
C 332	C 706	C194HiCu	HastB3	I-706	Nimonic75
C 340	C 710	C197HiCu	HastC2000	I-713	Nimonic80A
C 342	C 715	Elec Cu	HastC22	I-718	Nimonic90
C 360	C 745	Muntz	HastC276	I-720	PWA1480
C 377	C 752	NarloyZ	HastC4	I-722	PWA1484
C 425	C 814	SeBiLOYI	HastF	I-725	RA333
C 443	C 836	SeBiLOYII	HastG	I-738	Rene125
C 464	C 857	SeBiLOYIII	HastG2	I-750	Rene142
C 482			HastG3	I-792	Rene220
C 485			HastG30	I-800	Rene41
			HastN	I-801	Rene77
			HastR	I-825	Rene80
			HastS	I-901	Rene95
			HastW	I-903	Supertherm
			HastX	I-907-909	Udimet500
			Haynes214	I-939	Udimet520
			Haynes230	IN100	Udimet700
			HR160	MarM002	Waspaloy
			HyMu80	MarM200	
				MarM246	

Table 14 Low-alloy and chrome-moly steels

Low-Alloy Steels	Chrome-Moly Steels
3310	1 1-4 Cr
4130	2 1-4 Cr
4140	5 Cr
4340	9 Cr
8620	P91
9310	
12L14	
A10	
Carb 1-2 Moly	
Carbon Steel	
P20	
135 N	

Table 15 Stainless, Ti, and Tool steels

Stainless Grades			Ti Grades	Tool Steels
201	17-7 PH	H12	Cp Ti	A2
203	19-9DL	H13	Cp Ti Pd	A6
303	19-9DX	Haynes556	Ti 12	A7
304	20Cb3	Incoloy840	Ti 17	D2 or D4
309	20Mo6	Invar 36	Ti 3 2-5	D7
310	21-6-9	Kovar	Ti 6-22-22	H-11
316	25-4-4	M152	Ti 6-2-4-2	M1
317	254SMO	Maraging350	Ti 6-2-4-6	M2
321	26-1	MaragingC200	Ti 6-4	M4
329	29-4	MaragingC250	Ti 6-6-2	M42
330	29-4-2	MaragingC300	Ti 8	O1
347	29-4C	N-155	Ti 8-1-1	O2
410	302HQ	Ni-hard#1	Ti 10-2-3	O6
416	410 Cb	Ni-hard#4	Ti 15-3-3-3	S1
420	410-16-20	Ni-Span902	Ti 3-11-13	S5
422	904L	Nitronic40	Ti 5 - 2-5	S6

Table 15 Stainless, Ti, and Tool steels *(continued)*

Stainless Grades			Ti Grades	Tool Steels
430	A-286	Nitronic50	Ti 6-2-1-1	S7
431	AL6XN	Nitronic60	TiBetaC	T1
434	Alloy42	RA330		
440	AlnicoII	RA85H		
441	AlnicoIII	Zeron100		
446	AlnicoV			
2003	AMS350			
2101	AMS355			
2205	CD4MCU			
2205	Custom450			
2507	Custom455			
13-8 Mo	E-bite			
15-5 PH	Ferallium255			
15Mn7Cr	GreekAscoloy			

F.4 DELTA Premium and Premium Plus Factory Grade Library

Table 16 Aluminum, cobalt alloys, and speciality grades

Aluminum	Cobalt Alloys	Speciality Grades
319	Alloy 686	60Sn-40Pb
333	AlnicoVIII	63Sn-37Pb
356	Cobalt	96-4
357	Elgiloy	AZ31B
380	F75	AZ91A or C
383	FSX-414	SAC 300
384	Haynes188	SAC 305
1100	Haynes36	SAC 400
2007	HS-1	SAC 405
2011	HS-12	97-3
2018	HS-19	Ag
2024	HS-21	Au
2117	HS25-L605	Bi

Table 16 Aluminum, cobalt alloys, and speciality grades *(continued)*

Aluminum	Cobalt Alloys	Speciality Grades
2618	HS-31	Cb 103
3002	HS-4	CP Ta
3003	HS-6B	Cr
3004	Jetalloy	Densalloy
3005	MarM302	Hf
3105	MarM509	Mn
4032	MarM905	Mo
5005	MP35N	Nb
5042	MPN159	Ni
5052	Star J	Pb
5083	Ultimet	Pd
5086		Re
5154		Sb
5454		Se
5657		Sn
6040		TungCarb C
6061		TungCarb S
6063		V
6070		W
6253		Zn
6262		Zr
7005		Zr 2 or 4
7016		Zr 702
7019		Zr 704
7039		Zr 705
7050		
7072		
7075		
7104		
1100-plus		
2014-17		
2024-plus		

Table 16 Aluminum, cobalt alloys, and speciality grades *(continued)*

Aluminum	Cobalt Alloys	Speciality Grades
2098-2195		
2219-2519		
3003 or 4 or 5		
355-2		
5052-plus		
5056-82		
5086-plus		
6063-plus		
7049-149-249		

Table 17 Copper and nickel alloys

Copper Alloys			Nickel Alloys		
C 110	C 510	C863	20Mo4	I-102	MarM246
C 172	C 524	C 864	B 1900	I-49	MarM247
C 194	C 534	C 867	B-1900 Hf	I-600	MarM421
C 210	C 544	C 868	C-1023	I-601	Monel400
C 220	C 623	C 875	Colmonoy 6	I-602	Monel411
C 240	C 630	C 8932	GMR235	I-617	MonelK500
C 260	C642	C 903	GTD222	I-625	MuMetal
C 270	C 655	C 922	Hast BC1	I-690	Ni 200
C 310	C 667	C 932	HastB	I-700	NichromeV
C 314	C 673	C 937	HastB2	I-702	Nim101
C 330	C 675	C 954	HastB3	I-706	Nim263
C 332	C 687	C 955	HastC2000	I-713	Nimonic75
C 340	C 706	C194HiCu	HastC22	I-718	Nimonic80A
C 342	C 710	C197HiCu	HastC276	I-720	Nimonic90
C 360	C 715	Elec Cu	HastC4	I-722	PWA1480
C 377	C 745	Muntz	HastF	I-725	PWA1484
C 425	C 752	NarloyZ	HastG	I-738	RA333
C 443	C 814	SeBiLOYI	HastG2	I-750	Rene125
C 464	C 836	SeBiLOYII	HastG3	I-792	Rene142
C 482	C 857	SeBiLOYIII	HastG30	I-800	Rene220

Table 17 Copper and nickel alloys *(continued)*

Copper Alloys			Nickel Alloys		
C 485	C 861		HastN	I-801	Rene41
			HastR	I-825	Rene77
			HastS	I-901	Rene80
			HastW	I-903	Rene95
			HastX	I-907-909	Supertherm
			Haynes214	I-939	Udimet500
			Haynes230	IN100	Udimet520
			HR160	MarM002	Udimet700
			HyMu80	MarM200	Waspaloy

Table 18 Low-alloy and chrome-moly steels

Low-Alloy Steels	Chrome-Moly Steels
3310	1 1-4 Cr
4130	2 1-4 Cr
4140	5 Cr
4340	9 Cr
8620	P91
9310	
12L14	
A10	
Carb 1-2 Moly	
Carbon Steel	
P20	
135 N	

Table 19 Stainless, Ti, and Tool steels

Stainless Grades			Ti Grades	Tool Steels
201	17-4 PH	H12	Cp Ti	A2
203	17-7 PH	H13	Cp Ti Pd	A6
303	19-9DL	Haynes556	Ti 12	A7
304	19-9DX	Incoloy840	Ti 17	D2 or D4
309	20Cb3	Invar 36	Ti 3 2-5	D7

Table 19 Stainless, Ti, and Tool steels *(continued)*

Stainless Grades			Ti Grades	Tool Steels
310	20Mo6	Kovar	Ti 6-22-22	H-11
316	21-6-9	M152	Ti 6-2-4-2	M1
317	25-4-4	Maraging350	Ti 6-2-4-6	M2
321	254SMO	MaragingC200	Ti 6-4	M4
329	26-1	MaragingC250	Ti 6-6-2	M42
330	29-4	MaragingC300	Ti 8	O1
347	29-4-2	N-155	Ti 8-1-1	O2
410	29-4C	Ni-hard#1	Ti 10-2-3	O6
416	302HQ	Ni-hard#4	Ti 15-3-3-3	O7
420	410 Cb	Ni-Span902	Ti 3-11-13	S1
422	410-16-20	Nitronic40	Ti 5-2-5	S5
430	904L	Nitronic50	Ti 6-2-1-1	S6
431	A-286	Nitronic60	TiBetaC	S7
434	AL6XN	RA330		T1
440	Alloy42	RA85H		
441	AlnicoII	Zeron100		
446	AlnicoIII			
2003	AlnicoV			
2101	AMS350			
2205	AMS355			
2205	CD4MCU			
2507	Custom450			
13-8 Mo	Custom455			
15-5 PH	E-bite			
15Mn7Cr	Ferallium255			
	GreekAscoloy			

Appendix G: DELTA Portable Workstation

G.1 Product Overview

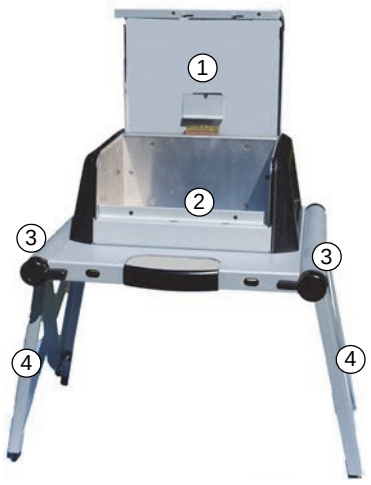
The DELTA Portable Workstation provides a fully shielded, rugged test stand for benchtop or remote-controlled testing. It is comprised of:

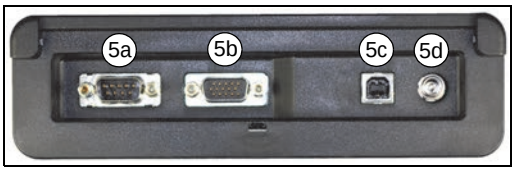
- An A020-D workstation (U8990865)
- Any DELTA handheld analyzer model

NOTE

In this configuration, the DELTA is controlled by the Olympus DELTA PC software. The open-beam handheld analyzer is then converted into a closed-beam workstation.

G.1.1 Portable Workstation

Component Key		DELTA Portable Workstation — All Models
1	Hinged lid	
2	Test chamber	
3	Locking levers	
4	Hinged leg	

Component Key		DELTA Portable Workstation — All Models
5	I/O panel: • Serial 9-pin D-Subminiature connector (5a) • 15-pin D-Subminiature connector for the probe adaptor (5b) • USB port (5c) • AC power port (5d)	

G.1.2 Accessories

Component Key		DELTA Portable Workstation — All Models
1	DELTA probe adaptor with integrated interface cable (P/N: U8990809)	
2	USB cable (mini USB B to USB A connector) [P/N: U8990455]	
3	Cal Check coupon (316 stainless steel) [P/N: U8990448]	
4	AC adaptor (18 VDC, 3.9 A)	

G.2 Safety Information

G.2.1 Radiation Safety Information

The DELTA Portable Workstation is a secure and dependable system when used in accordance with recommended testing techniques and safety procedures. The radiation detected in the area outside the closed workstation is below the prescribed limit for unrestricted areas.

WARNING

- Olympus analyzers must only be used by trained and authorized operators in accordance with proper safety procedures. Improper use may impair safety protection and cause potential harm to the user.
- Read all warning signs and labels (see Figure G-1 on page 153 and Figure G-2 on page 153).
- DO NOT USE the workstation if it exhibits any sign of damage, as doing so could result in unintentional emission of stray radiation. If any damage is found or suspected, have a qualified professional perform a radiation safety test and repair the workstation.

Figure G-1 Caution radiation label on top of workstation

G.2.2 AC Adaptor

Use only the included AC adaptor (18 VDC) to power the DELTA Portable Workstation.

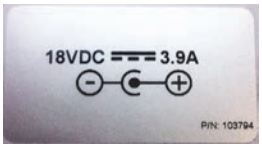


Figure G-2 DELTA Portable Workstation voltage label

CAUTION

Using incompatible equipment could cause malfunction and/or equipment damage.

G.2.3 Safety Interlock Structure

This mandatory feature ensures that the DELTA Portable Workstation functions as a closed-beam X-ray system. To establish a radiation-safe test chamber, the lid must be completely closed over the test platform. Until this condition is met, no test analysis or Cal Check procedures can be initiated.

Examples of the safety interlock structure:

- If the lid is not closed (the safety interlock structure is not engaged for X-ray emission), the Cal Check button or Start Test button is disabled (grayed out). It is not possible to force the X-ray On condition.
- If the lid is opened during an active test, the X-ray tube turns off immediately, and a "Test Aborted" message is displayed. The instrument turns off.

G.2.4 X-Ray Indicator

The X-ray indicator is located on the top of the workstation (see Figure G-1 on page 153). This indicator consists of a four-element amber LED array and has two key functions:

- X-ray indicator continuously On (solid amber LED array)

  This signifies that the X-ray tube is enabled.
- X-ray indicator flashing On (blinking amber LED array)

  This signifies that the analyzer is emitting X-ray radiation through the measurement window.

G.2.5 Software Proximity Sensor

Within one second of the start of a test, the analyzer detects the sample in front of the measurement window. If no sample is detected, the X-rays automatically turn off.

G.2.6 Shut Down Under Emergency Conditions

If you believe that the analyzer is locked up in an On condition, and the amber LED array continues to blink, perform the following procedure.

To shut down the analyzer in case of an emergency

◆ Press the **Stop Test** button on the user interface.

OR

Unplug the probe adaptor cable from the 15-pin D-Subminiature connector on the workstation (see section G.1.1 on page 151).

OR

Raise the lid.

NOTE

Opening the lid will not compromise the integrity of the test data.

G.3 Physical Planning

G.3.1 Workstation Footprint

The DELTA Portable Workstation weighs 8.9 kg (19.6 lb) with the probe adaptor, analyzer, and battery included.

To make a minimum footprint for the workstation, add at least 5.1 cm (2 in.) to the actual 52.1 cm (20.5 in.) width and 37.5 cm (14.75 in.) depth. Plan for a 70 cm (27.5 in.) height when the lid is fully open (see Figure G-3 on page 155). You should be able to comfortably access the analyzer's lid latch and test chamber.

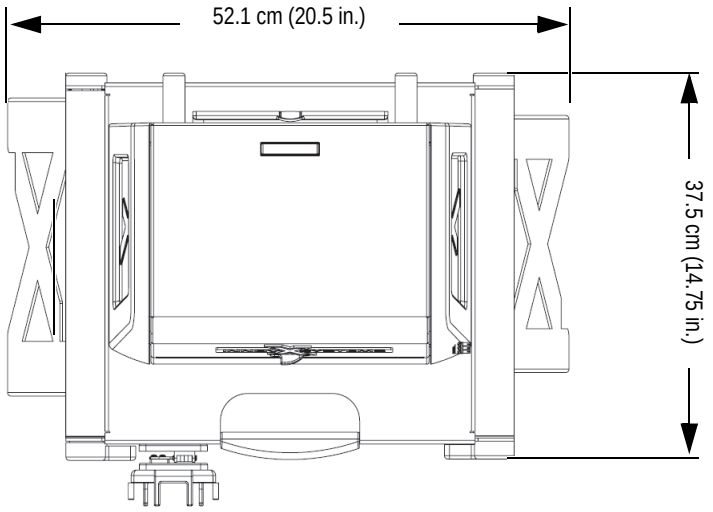


Figure G-3 The Workstation: Top view (looking straight down)

G.3.2 Test Chamber Dimensions

	Component key	cm	in.
1	Width (side wall to side wall)	24.8	9.75
2	Depth (front to back)	15.6	6.125
3	Center of window to front wall	9.5	3.75
4	Center of window to rear wall	7	2.75

	Component key	cm	in.
5	Internal height (lid closed) [not shown]	12.4	4.875

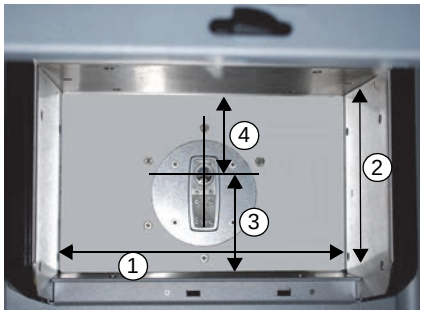


Figure G-4 The test chamber: Top view (looking straight down)

G.3.3 Electrical Requirements

You can use either the removable Li-ion battery (standard) or an AC adaptor (optional). You may also want to use the DELTA docking station or a standard battery charger in the workstation area.

NOTE

Both of the charging accessories require an AC power source.

G.4 Assembling the Workstation

CAUTION

To avoid equipment damage, make sure that there is sufficient clearance when assembling the workstation (see section G.3.1 on page 155).

To assemble the workstation

1. Place the workstation on a table or a bench with its legs facing toward you (see Figure G-5 on page 157).
2. Make sure that the locking levers are in the release position (see Figure G-5 on page 157).

Figure G-5 The folded workstation

3. Swing the legs out to their fully extended position.
4. Lock the legs into place using the two locking levers (see Figure G-6 on page 157).

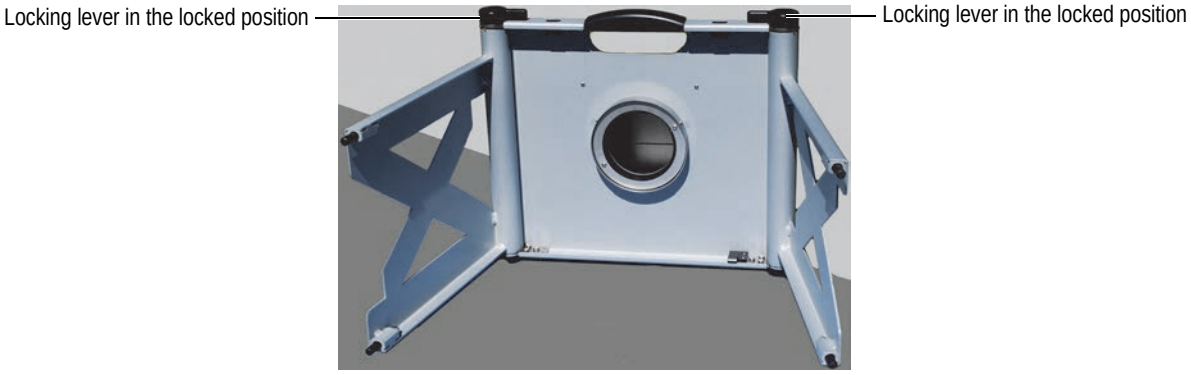


Figure G-6 The legs locked into position

5. Place the workstation upright.
6. If necessary, use leveling feet to stabilize the workstation.
7. Slide the latch (see Figure G-7 on page 157) to the right and open the lid.

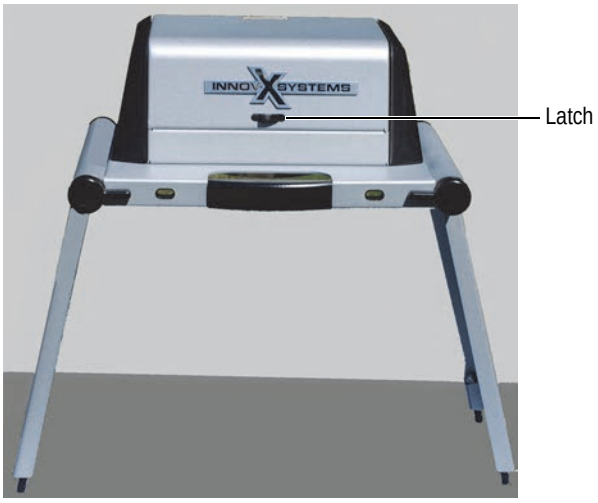


Figure G-7 The lid latch

G.5 Disassembling the Workstation

Before disassembling the workstation, complete the following:

- Turn off the DELTA analyzer.
- Unplug the AC adaptor.
- Remove the analyzer-adaptor assembly from the workstation.

CAUTION

Turn OFF the DELTA analyzer before removing the probe adaptor from the workstation. Failure to turn OFF the analyzer could result in unintentional operation during removal.

To disassemble the workstation

1. Place the workstation on a table or a bench with its legs facing toward you (see Figure G-8 on page 158).

Figure G-8 The Legs locked into position

2. Set locking levers to release position (see Figure G-9 on page 158).

Figure G-9 The folded workstation

3. Swing the legs in to their folded position.

4. Lock the legs into place using the two locking levers.

G.6 Configuring the Workstation

Before using the workstation, complete the following:

- Turn off the DELTA analyzer.
- Install the DELTA analyzer on a probe adaptor.
- Install the analyzer-adaptor assembly on the workstation.

CAUTION

Turn OFF the DELTA analyzer before installing the probe adaptor in the workstation. Failure to turn off the analyzer could result in unintentional operation during assembly.

To install the probe adaptor onto the DELTA analyzer

1. Loosen the two probe-adaptor thumbscrews.
2. Connect the DELTA analyzer to the probe adaptor's 16-pin connector (see Figure G-10 on page 159).

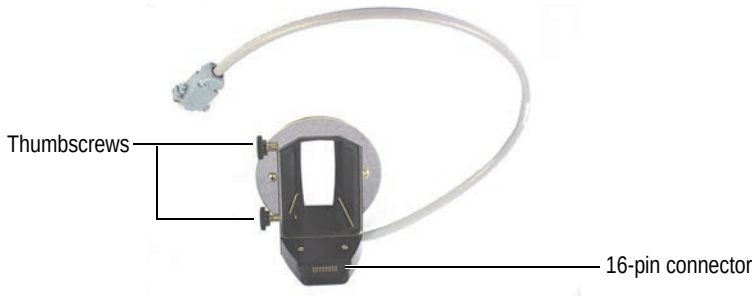


Figure G-10 The probe adaptor

3. Make sure that the DELTA measurement window is flush with the probe-adaptor faceplate (see Figure G-11 on page 159).

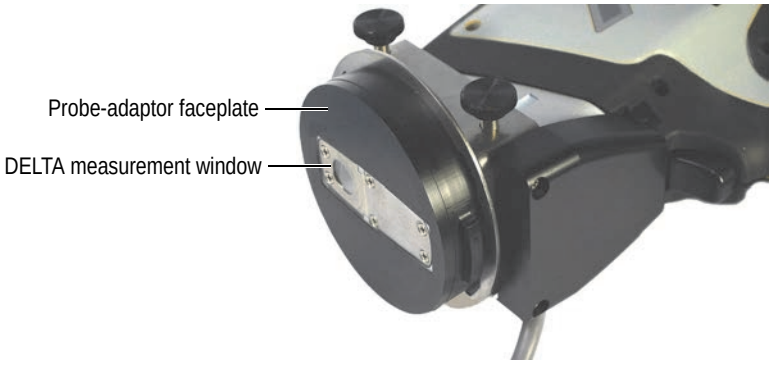


Figure G-11 The DELTA measurement window flush with the probe-adaptor faceplate

4. Tighten the two thumbscrews, making sure that the measurement window stays flush with the probe-adaptor faceplate.
5. Install the analyzer-adaptor assembly on the workstation (see ““To install the analyzer-adaptor assembly onto the workstation” on page 161”).

To install the analyzer-adaptor assembly onto the workstation

1. Unfold the workstation (see ""To assemble the workstation" on page 156").
2. Position the workstation so that the locking fixture is accessible (see Figure G-12 on page 161).

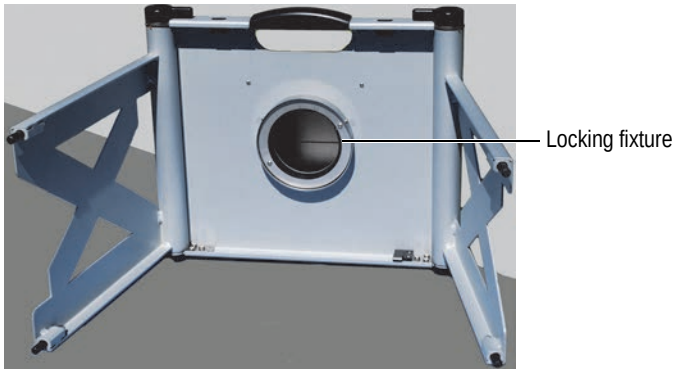


Figure G-12 The test-stand locking fixture

3. Align the large tab of the probe adaptor with the large notch of the locking fixture (see Figure G-13 on page 161).

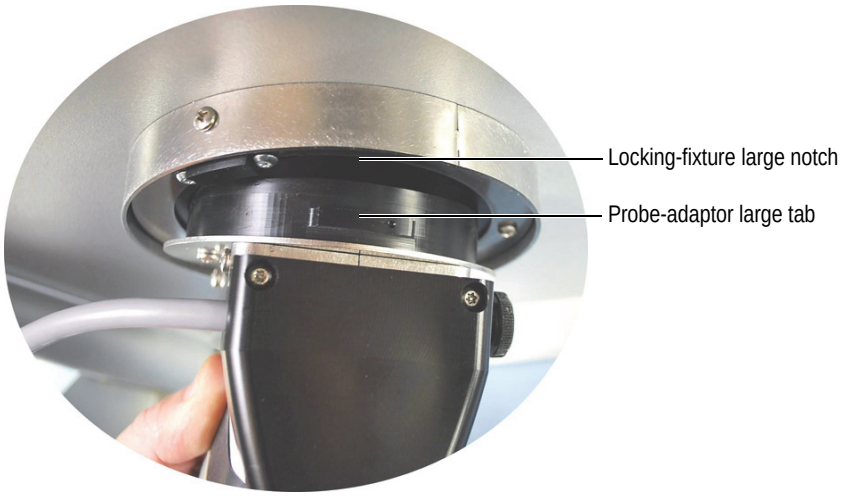


Figure G-13 Alignment with locking fixture

4. Make sure that the probe-adaptor faceplate is flush with the test chamber floor.
5. Carefully turn the analyzer-adaptor assembly counterclockwise until it locks.
6. The probe-adaptor plastic housing must be centered with the locking-fixture alignment screw (see Figure G-14 on page 162).

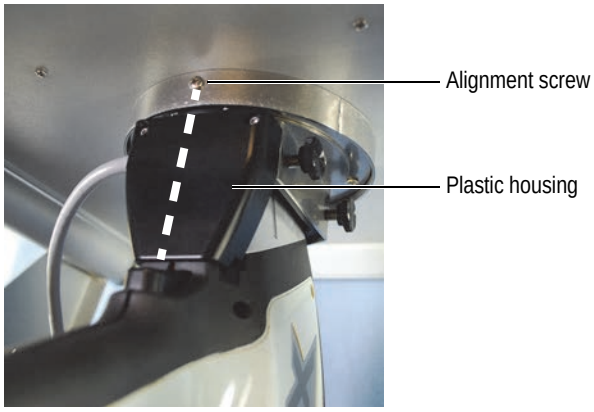


Figure G-14 The analyzer-adaptor assembly installed on the workstation

7. Place the workstation in the upright position
8. Connect to workstation to your PC (see "To connect the workstation to a PC" on page 162).

To connect the workstation to a PC

1. Connect the probe-adaptor interface cable (15-pin D-Subminiature connector) to the workstation I/O panel (see Figure G-15 on page 162 and Figure G-16 on page 162).

Figure G-15 The probe-adaptor interface cable

Figure G-16 Test-stand I/O panel

2. Plug the mini USB connector into the DELTA Portable Workstation USB port.
3. Plug the USB connector into a PC USB port.

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