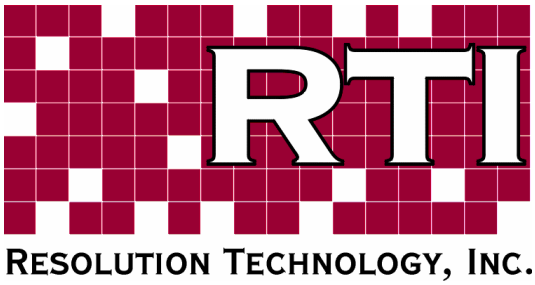
LayerTech

Image Measurement System

User Guide



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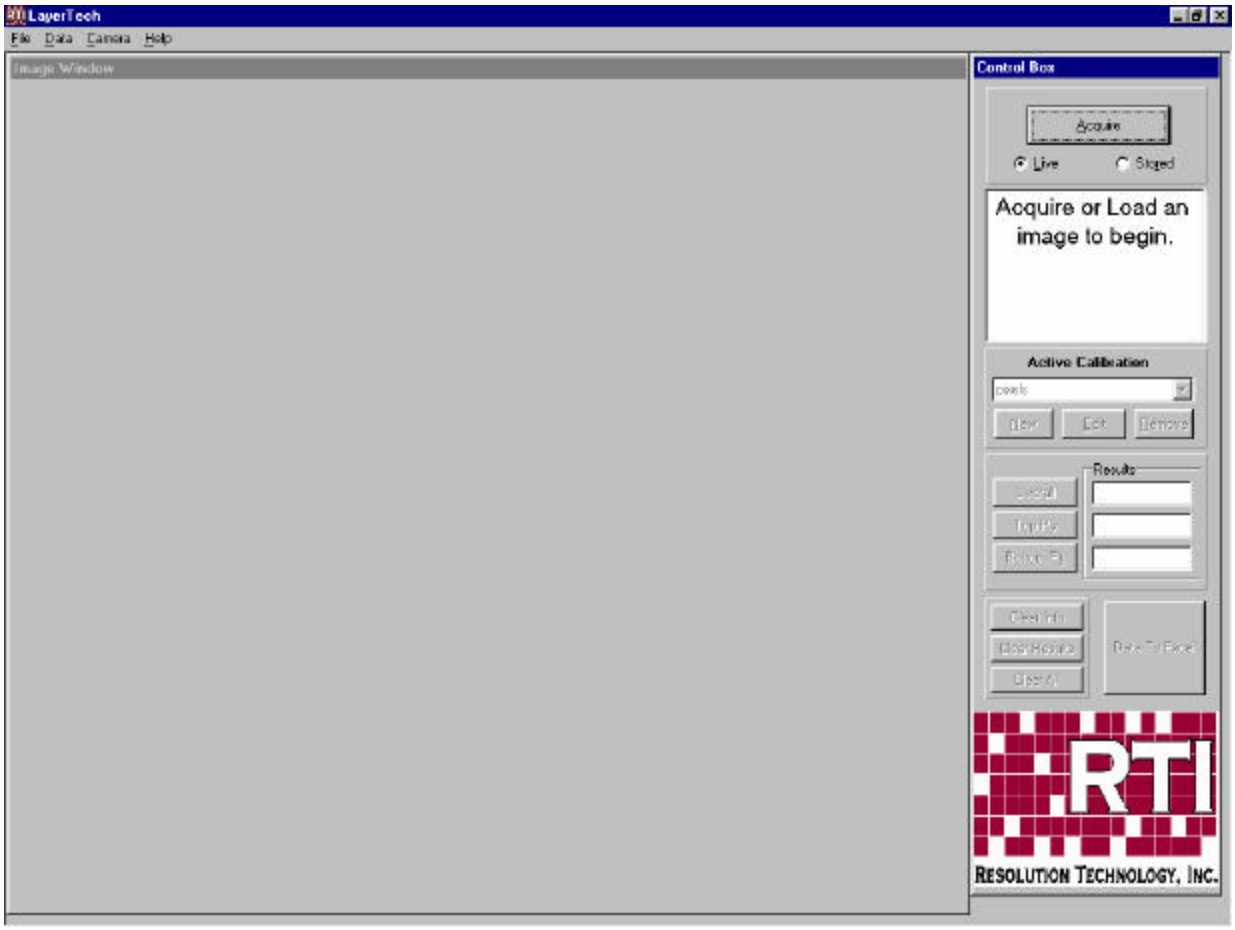
Introduction:
It is suggested that this entire manual be read before beginning the use of the LayerTech systems. It provides an overall familiarity with the use and functionality of the systems, as well as detailed descriptions of how to perform required tasks. Additionally, setting up the calibration(s) for the system is discussed at the top of Page 3 and in the body of Pages 4 and 5, but should be considered in advance of following the sequence of steps presented in the section Application Workflow. Understanding the process of calibrating is as important as any other functionality provided by LayerTech.

Overview
LayerTech is a custom measurement application provided by Resolution Technology, Inc. LayerTech provides the capability to make three measurements within an image and to send the extracted data and associated information to Microsoft Excel.

Functionality
This functionality is accomplished through a single-monitor system interface. The user interface is shown here.

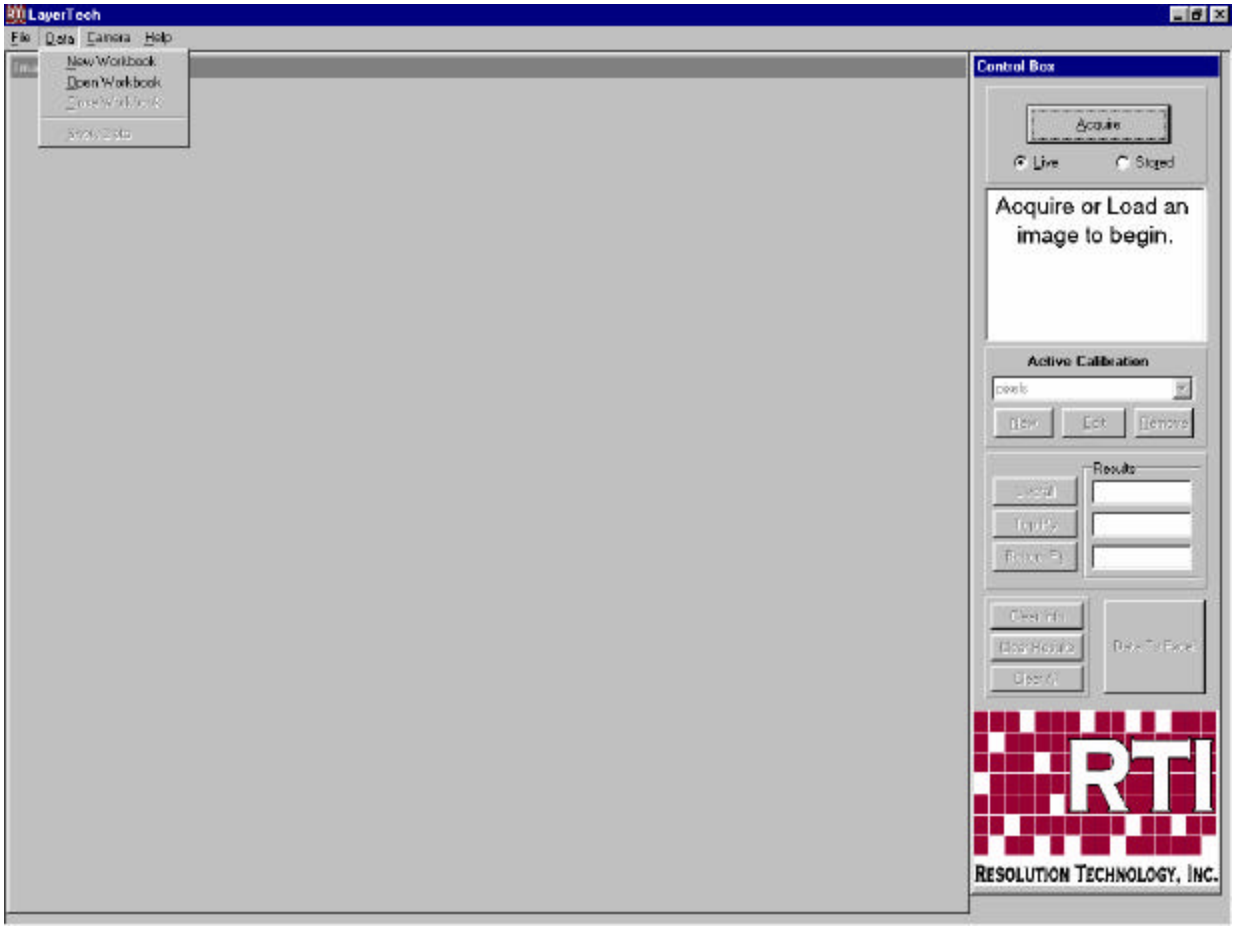


Application Workflow:

1. Select the **Data** menu item and choose between **New Workbook** and **Open Workbook** (shown below)
    a. Clicking on **New Workbook** will allow the user to type in a name to open a new Excel workbook
        i. Type the name into the box in the format filename.xls
        ii. If an existing workbook or filename is selected when using the **New Workbook** menu item, the option will be offered to replace the existing workbook with a new workbook of the same name. The existing data in that workbook will immediately be lost.

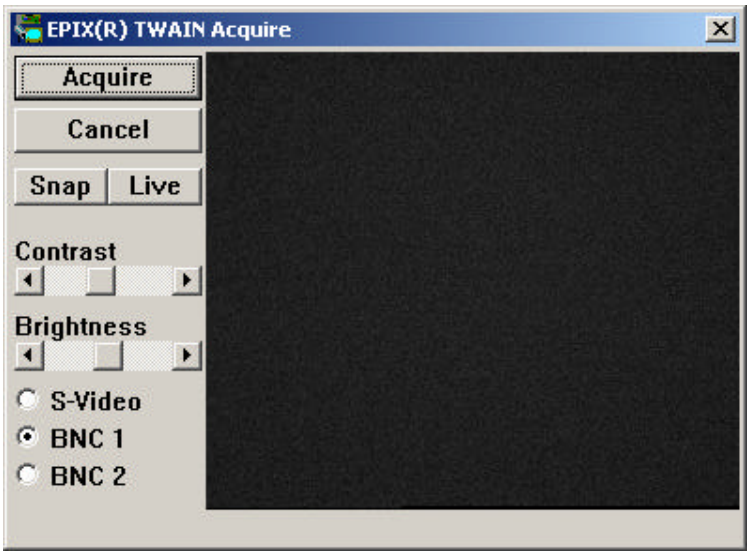
OR

    b. Clicking on **Open Workbook** will allow the user to use the Windows® directory structure to select and open an existing Excel workbook. This option will locate the last row in the sheet chosen, pad by a blank row, insert the column headings, and begin adding data onto the sheet.



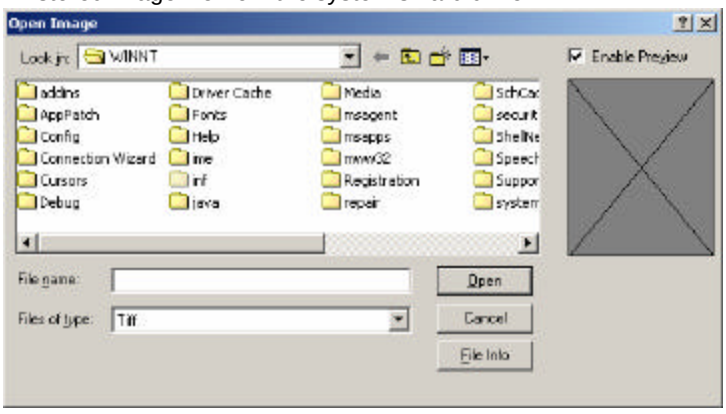
The next step in the process is to set up calibrations for the system. However, in order to calibrate the system, an image must be acquired to activate the calibration tools. (This image should be of the calibration scale or ruler under the same settings and conditions the measurement images will be acquired). As such, this manual first describes how to acquire a new image, and then describes the calibration process. Once the calibrations are in place, the calibration steps are not required for every measurement session. **Important**: Do not calibrate from a stored image unless it is possible to return the camera and microscope configuration to EXACTLY the same settings or positions under which that image was acquired.

2. **Acquire** or **Load** an image using the tools at the top of the Control Box
    a. **Acquire** a new image by selecting the **Live** radio button and clicking on the **Acquire** button
        i. The dialog box shown below will be displayed and the black area will be filled by the live image from the camera
            a. For calibration images, it is important that the scale be positioned so it is vertical in the image. The distances measured are vertically oriented so the calibration should be done in the vertical axis.
        ii. Compose the image and focus as required.
        iii. When ready to capture the image, click the **Acquire** button located in the **EPIX® TWAIN Acquire** dialog box.
        iv. The dialog box will disappear and the image will be displayed in the **Image Window** on the LayerTech application.



OR

    b. **Load** an image by selecting the **Stored** radio button and clicking on the **Load Image** button
        i. This will bring up an Open File dialog box (shown below) and allow the user to select a stored image file from the system's hard drive.



ii. Clicking once on an image file name will present a preview of the image in the gray box shown to the right of the dialog (currently filled with a large “X”.
iii. Once the desired image file is located, either click on the Open button, or double-click on the file name to open the image from the hard disk

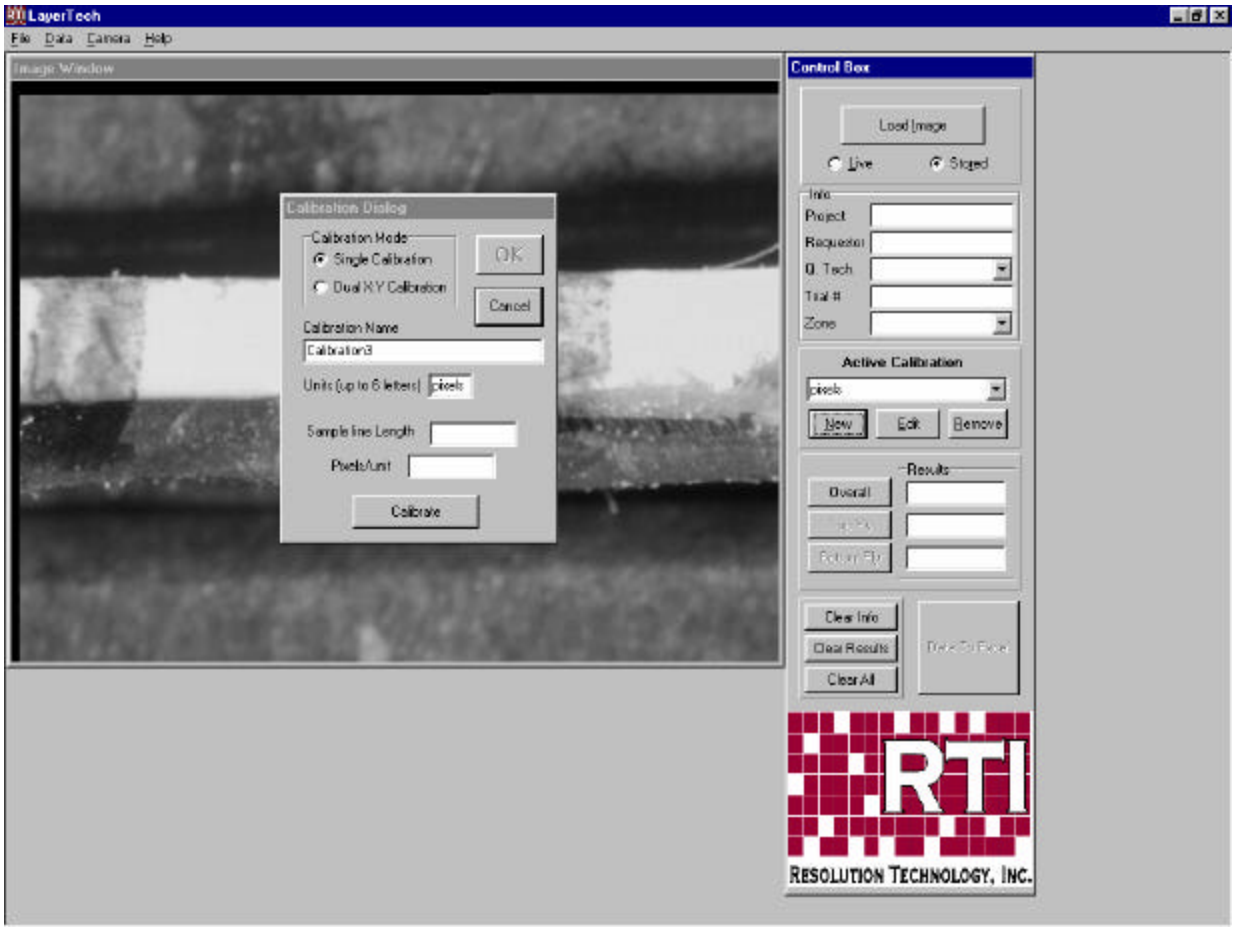
3. Upon acquiring or opening an image, the **Active Calibration** toolbox. Is activated in the **Control Box** (shown below)
    a. The **dropdown list box** allows the user to choose between calibrations that have already been created.
    b. **Note**: The first step to creating or editing a calibration is to acquire an image of your calibration scale. This image should be taken from the same focus, zoom, and/or magnification position from which the images to be measured are taken.
        i. The **New** button allows the user to add a calibration to the system.
            a. See below under Step 4 for more information.

            OR

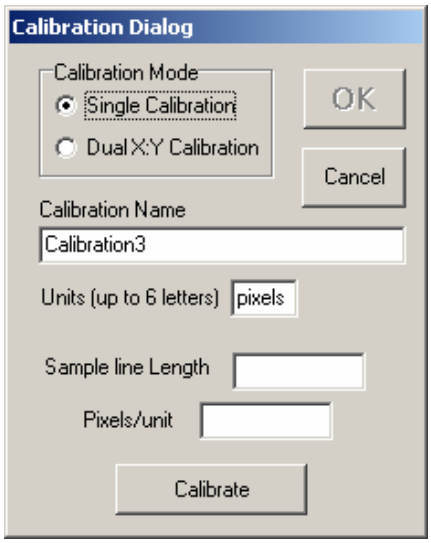
        ii. The **Edit** button allows the user to modify a calibration already in the list.
            a. This will modify the calibration named in the window of the dropdown list.
            b. See below under Step 4 for more information.

            OR

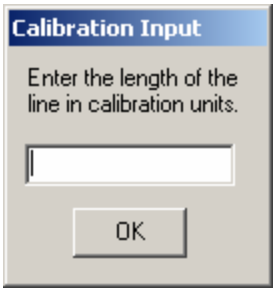
        iii. The **Remove** button allows the user to remove a calibration



4. The **Calibration Dialog** box provides the user the tools to calibrate the system for accurate spatial measurements.
    a. Select **Single Calibration** for **Calibration Mode**
        i. **Single Calibration** (shown in the figure below) should be used for all LayerTech calibrations. The scale should be oriented vertically in the image

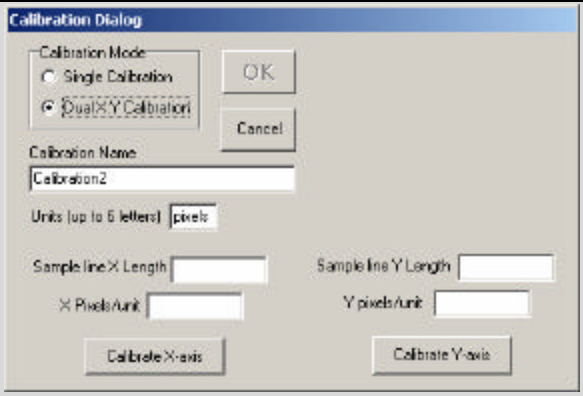


    b. Choose a name for the new calibration by typing in the **Calibration Name** box
        i. If you got into this dialog box by choosing to **Edit** an existing calibration, leave the name the same
    c. Choose a descriptor for **Units** that is less than 6 characters
        i. Examples: “mm, um, microns, mils, inches”
    d. Click the **Calibrate** button
        i. A “crosshair” cursor will be presented on the image
        ii. Place the center of this cursor at one end of your scale and left click to mark the first point.
        iii. Move the cursor to the other end of your scale and left click again to register the second point
    e. In the **Calibration Input** box that pops up, enter value for the real-world distance represented by the line in the calibration image.



        i. Click the **OK** button
    f. In the **Calibration Dialog**, the **Sample Line Length** will be automatically filled in, as will the value for **Pixels/Unit**. This value indicates the real world spatial distance represented by each pixel in the image.
    g. In the **Calibration Dialog** box, the **OK** button should now be active
    h. Clicking the **OK** button will add the new (or modified) calibration to the list and switch to it automatically.

i. **Dual X:Y Calibration** (shown in the figure below) is included as part of the standard calibration tools, but **should not** be used for LayerTech purposes**.** LayerTech calibrations should be established using **Single Calibration** and the scale should be oriented vertically in the image.



Repeat the above steps to create multiple calibrations as required. Once the required calibrations are established, repeat the process in Step 2a to acquire the image to measure. Once the calibrations are set up and an image to measure has been acquired, proceed with Step 5.

5. Once an image is open in the **Image Window**, the **Info** box in the **Control Box** also becomes active.
    a. If desired, fill in any combination of fields in the **Info** box with information to be sent to Excel along with the extracted measurement data.

6. When the user is prepared to make measurements, the user begins by clicking the **Overall** button, which has also been activated. Upon clicking the **Overall** button, mouse movement will control a horizontal line within the **Image Window**.
    a. Place the top line by clicking the left mouse button.
    b. Move the mouse and place the bottom line with another click of the left mouse button.
    c. The resulting measurement (distance between top and bottom line) will be reported back in the **Results** box field next to the **Overall** button (in positive, calibrated units).

        o At this point, the **Top Ply** and **Bottom Ply** buttons will become active. The three **Clear…** buttons will also become active, as will the Data to Excel button.

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From this point, several possibilities exist for the user, depending on the situation. Each case or decision is discussed briefly as follows:

Decision 1: Top / Bottom Ply Measurements: Needed or Not Needed

Top Ply and/or Bottom Ply Measurements Needed:

1. As before, the user initiates a measurement by clicking the appropriate button (**Top Ply** or **Bottom Ply**). The cursor will again be placed in the image to control a horizontal line in the image frame.
    - The previously placed lines for the **Overall** measurement will remain on screen.

    a. **Top Ply** button is clicked:
        i. The user will place the Top Ply line by clicking the mouse button
            a. Placement of this line is restricted to the portion of the image between the two lines previously placed for the **Overall** measurement.
        ii. The resulting measurement (distance between top line and top ply line) will be reported back in the **Results** box field next to the Top Ply button (in positive, calibrated units).

    b. **Bottom Ply** button is clicked:
        i. The user will place the Bottom Ply line by clicking the mouse button
            a. Placement of this line is restricted to the portion of the image between the two lines previously placed for the **Overall** measurement.
        ii. The resulting measurement (distance between bottom line and bottom ply line) will be reported back in the **Results** box field next to the Bottom Ply button (in positive, calibrated units).

Top Ply and/or Bottom Ply Measurements NOT needed:

1. The system is programmed so as not to require that a Top Ply or Bottom Ply measurement be taken in order to proceed. If only the "overall" measurement is needed, simply proceed with the application.

Decision 2: Data to Excel Spreadsheet: Needed or Not Needed

Data to Excel Needed:

1. Decision 3: **Info** box contents: Correct or Incorrect

    Info box contents Correct:

    1. Decision 4: **Results** box contents: Correct or Incorrect

        Results box contents Correct

        a. Click the **Data to Excel** button
        b. See the Data to Excel section for additional information

        Results box contents Incorrect

        a. Click the **Clear Results** button
        b. Refer to Step 6 in the Application Workflow section to extract new Results
        c. Refer to section *Results box contents Correct* (above)

    Info box contents Incorrect: (Alternative choice for Decision 3 above)

    1. Click **Clear Info** button
    2. Enter correct info into boxes as needed
    3. Refer to section *Info box contents Correct* (above)

Data to Excel NOT needed: (Alternative choice for Decision 2 above)

1. Click the **Clear All** button to clear the **Info** box and the **Results** box
2. The application reverts to its initial condition and the user starts a new image by choosing between acquiring a new live image and opening a stored image.

Data to Excel

1. *Preparation for Data Transfer*: (prior to clicking the "Data to Excel" button)
    a. See Step 1 under the Application Workflow section above
        - See Data Transfer (Item 3 below).

2. If the "Data to Excel" button is clicked prior to *Preparation for Data Transfer*
    a. The user will be presented with a small dialog box indicating "You have not selected a target workbook for your data output." The box will also present the user with two buttons:
        i. **New Workbook** button:
            - This will open a new blank workbook.
            - See Data Transfer (Item 3 below).
        ii. **Open Workbook** button:
            - This will allow the user to select from existing Excel workbooks. If this option is selected, the program will locate the lowest row of data in the selected sheet, pad the data transfer with one blank row, and begin exporting data to the following row.
            - See Data Transfer (Item 3 below).

3. Data Transfer
    a) Each time the **Data to Excel** button is clicked, the contents of the **Info** box and the **Results** box will be transferred to Excel and the target workbook will be automatically saved.
        - Automatically saving the open workbook with each transfer will prevent unexpected data loss in the even of a system crash or power failure.

4. **Close Workbook** menu item (found under **Data** menu)
    a. Close Workbook is only available after an Excel workbook has been opened
    b. This option allows the user to close the current workbook in the event they want to start a new workbook or open a different existing workbook for adding new data
    c. This item does not have to be selected before closing LayerTech. Each time data is sent to Excel the file is saved, as mentioned above. When LayerTech is closed, the workbook that is open at the time is automatically closed as part of the shutdown

5. **Show Data** menu item (found under **Data** menu)
    a. Once a workbook is open in Excel (via **New Workbook** or **Open Workbook)**, the **Show Data** menu item becomes active.
    b. Click on **Show Data** to make Excel visible on the desktop for viewing the information in the workbook
        i. Note: Once Excel is visible, the user has control of the interaction with Excel and improper execution at this point can break the link between LayerTech and Excel and cause unrecoverable application errors.
        ii. While viewing the Excel sheet in this manner, users should not:
            a) Change the position of the highlighted cell
            b) Manually add or edit any cell contents
            c) Minimize or Close the Excel window
            d) Perform any File operations such as Save, Open, etc.
        iii. In general, while Excel is being displayed (from within LayerTech through the **Show Data** menu function), users should not interact with Excel in any way other than to view their data.
            a) Interaction with the Excel workbooks, such as adding formulas, can be done outside of LayerTech by simply running Excel from the Programs menu and opening the desired workbook using File | Open.
    c. When done viewing the Excel workbook, it is critical that the proper method for returning to LayerTech is followed
        i. Simply move the mouse cursor to the bottom of the screen until the Windows® Task Bar pops up (shown below) and click on the button for LayerTech. This will give LayerTech back the focus and will hide Excel.

    d. It is acceptable to utilize the **Show Data** menu item and expose Excel as often as desired, so long as the proper sequence to return to LayerTech is followed

Application Menu Items

1. Data
    a. See above Step 1 of the Application Workflow section, or under the section Data to Excel

2. Camera
    a. The setting for this menu item controls what happens when the user chooses to acquire a live image (as opposed to selecting a stored image from disk). When the user clicks the **Acquire** button, the following will occur, depending on "checked" or "unchecked"
        i. **Show Camera Interface**: checked
            - A camera interface control box will be displayed showing the live image on screen.
            - The live image can be viewed and adjusted for focus, content, etc.
            - A second mouse click will be required to Freeze the image once it is as the user requires.
            - When the image is acquired, proceed with Step 3 in the Application Workflow section

        i. **Show Camera Interface**: unchecked

NOTE: This portion of functionality is implemented but not currently functioning properly. Please do not attempt to utilize this method until we can locate the problem and, if possible, correct it. Thank you.

- No control box is displayed
- The live image is not displayed
- No additional mouse click is required for acquisition
- When the image is acquired, proceed with Step 3 in the Application Workflow section
- This option is more efficient when the image content and focus are known to be acceptable and no manipulation is necessary.

3. Help → About
    a. Displays application version information and Resolution Technology, Inc. contact information
        - Due to its relative simplicity, this application will not be developed with context-sensitive, online help. If assistance with this application is needed that goes beyond the scope of the User Guide, please contact Resolution Technology, Inc. using the information provided.

Control Box Info Box Items

1. **Sample Number**
    - Alpha-numeric data entry field; will accept any characters input
2. **Requestor**
    - Alpha-numeric data entry field; will accept any characters input
3. **Q-Tech**
    - Drop down list: The contents of this list will be contained in an Initialization file. This file, and thus the contents of the list, are user-editable using Notepad. (See below)
4. **Trial Number:**
    - Alpha-numeric data entry field; will accept any characters input
5. **Zone**
    - Drop down list: The contents of this list will be contained in an Initialization file. This file, and thus the contents of the list, are user-editable using Notepad. (See below)

Editing Drop down list contents

1. Open the appropriate file in Notepad
    a. Zone.ini for the zone list
    b. QTech.ini for the technician list
2. To add items to the dropdown list, enter the new item on a new line
3. Add the new item as text surrounded by square brackets.
    a. example: [new item]
4. To remove an item, delete it.
5. Choose Exit from the file manu, and select Yes when prompted to save.

