EtchTemp Low Temperature (ET LT) Wafer

User Manual

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This manual applies to **EtchTemp Low Temperature (ET LT) Wafer** only.

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Important Notices

Warranty

EtchTemp Low Temperature (ET LT) Wafer System Hardware

KLA warrants that the EtchTemp Low Temperature (ET LT) Wafer Systems (Products) sold will be free from defects in material and workmanship and perform to KLA's applicable published specifications for a period of 6 months after shipment. ET LT wafer is warranted for 6 months from date of shipment, 4 measurement hours, or consumption (whichever comes first) for failures caused by component and assembly defects. Refer to the specification provided with your wafer for the exact warranty terms. The liability of KLA hereunder shall be limited to replacing or repairing, at its option, any defective Products that are returned Free on Board (FOB) to KLA SensArray division plant in Milpitas, CA. In no case are Products to be returned without the purchaser first obtaining SensArray's permission and Returned Materials Authorization (RMA) number. In no event shall SensArray be liable for any consequential or incidental damages. Products that have been subject to abuse, misuse, accident, alteration, neglect, improper storage, or unauthorized repair or installation are not covered by this warranty. SensArray will make the final determination as to the existence and cause of any alleged defect. SensArray is not responsible for maintaining or supplying any consumable materials used in conjunction with this hardware. No warranty is made with respect to any customized equipment or Products supplied with ET LT Wafer systems where produced to Purchaser's specifications except as specifically stated in writing by SensArray in the contract for such Products. The purchaser will pay the shipping costs of returned materials to SensArray; SensArray will pay the cost of shipping repaired/replaced material to Purchaser. This Warranty is the only warranty made by SensArray with respect to the Product delivered hereunder and may be modified only by a written instrument that is signed by a duly authorized officer of SensArray and accepted by Purchaser. Except as provided above, SensArray makes no warrantees, expressed or implied, including any warranty of merchantability for a particular purpose.

Software

KLA (SensArray division) warrants that (a) SensArray Tools software (Software) will perform substantially in accordance with the accompanying written materials for a period of 12 months after shipment, and (b) the medium on which the Software is recorded will be free from defects in materials and workmanship under normal use and service for a period of 12 months after shipment.

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Regulatory Information

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Any changes or modifications to this device not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This equipment complies with the FCC radiation exposure limits for general population/uncontrolled exposure. To ensure user safety and to satisfy the FCC RF Exposure requirements for mobile transmitting devices, a separation distance of 20cm shall be maintained between the device and people during operation.

Trademarks

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Some of the technology used in this product is acquired under license from the management and operating contractor of the Oak Ridge National Laboratory on behalf of the U.S. Department of Energy.

Table of Contents

What You Need to Know

This user manual assumes that you are familiar with the version of the Windows operating system installed on your computer and can perform- as a minimum - the following tasks:

Start (boot) the computer.

Log on to Windows.

Select from menus.

Select and open files

Use a mouse or pointer, including how to point and click to select objects and operate controls such as buttons.

Use standard window controls such as scroll bars.

Conventions Used in this Manual

Several standard conventions are used in the text of this manual to make the information presented a little clearer and easier to understand. Every attempt is made to be consistent in the application of these conventions.

Note: Highlights important additional information.

Bold Bold text indicates button names, icon names, and menu items.

italic Italic text indicates the section and/or chapter name in a cross-reference. For example: See the *Using the Acquisition Setup Window* section of Chapter 3, *Acquiring Data*, for more information. Italic text can also be used to emphasize a word or phrase.

Courier Typeface | Courier typeface indicates file names, directories, and text that you enter. For example: The file is located in the `C:\Sensarray\Configs` directory.

<Key> A word offset by angle brackets indicates a key on the computer keyboard. For example: After you specify the parameters, press the <Enter> key.

Hyperlinks By clicking on the refrence link, you can easliy move to the chapter/sections referreed.

Indicates important safety information. The icon is usually associated with a caution in this document describing potential damage to the wafer. Other international standard icons specific to a particular hazard or action may be used in place of the exclamation mark.

Indicates important wafer handling information. This icon is associated with a caution in the document describing potential product damage or particle contamination if the wafer is not handled according the instructions associated with the icon.

Images

The images shown in this document are reference only. The actual image may vary at the time of real-time operation/analysis.

Using This Manual

Cautions and Wafer Handlings

It is extremely important that the warnings and cautions on this page should be observed.

Caution

- Wafer is sensitive to temperature during storage.

- Wafer may be damaged, and warranty voided by storing the wafer outside the recommended temperature range.

- Wafer should always be stored between 15 ºC (59 ºF) and 40 ºC (104 ºF).

- Wafer should always be stored in SensArray provided Storage Case or inside the AM FOUP.

Wafer Handling

- Never place the wafer on an uneven surface.
- A small downward pressure on the wafer applied at the right point could cause the wafer to break or cause cracks within the silicon.

Document Overview

This manual consists of the below sections:

ET LT Overview – Provides information about the features, components, and configurations of the ET LT Wafer System.

System Setup – Provides information about the system components, preparation of the equipment for the cleanroom, and connecting the system cables.

Preparing Equipment for the Cleanroom – Provides information about the cleanroom preparation for the ET LT Wafer System.

KLA AM FOUP – Provides information about the KLA AM FOUP function, Indicators, and controls, FOUP battery behavior, and AM FOUP charging.

Using the SensArray Tools Software – Provides information about the setup, acquisition features, and how to retrieve the measurement data using the AM FOUP.

Advanced Data Analysis – Provides information about to create templates, control limit, analysis recipes, and the SAT Analysis features.

Importing Files and Data – Provides information about download the data and re-tag the mission data.

1. ET LT Overview

The EtchTemp Low Temperature (ET LT) Wafer User Manual is designed for the users with a need to know use of the ET LT Wafer system with the **SensArray Tools (SAT)** software. This manual is applicable for ET LT wafer only. ET LT wafers will only work with SensArray Tools version 2.8.12 above (**Advanced Plasma Suites**).

This chapter provides the information about features of the ET LT Wafer System.

1.1   ET LT Wafer System

ET LT Wafer is a complete measurement system embedded with the wafer to record thermal surveys in semiconductor processing equipment without the need for wired connections. Embedding the components within the wafer allows it to be treated like a production wafer in most equipment, as long as it is within the operating temperature range of the wafer.

ET LT wafer system consists of an ET LT Wafer, an AM FOUP for communicating with and recharging the wafer, a magnet network cable, a laptop computer, and a CD/Pendrive containing the software and drivers required by the system.

This system can acquire data from 1 to 65 analog channels, depending on the model.

Measurements taken by the sensors are converted from analog to digital signals within the onboard electronics.

1.2   Acquiring Data

Using the ET LT Wafer to acquire temperature data in your equipment is a simple process. Measurement parameters, such as sensors to be used, scan rate, time delay, etc., are set up using the Controller software. The wafer is then transferred to the measurement chamber from the AM FOUP via robotic arms, and thermal survey data is acquired. The data can be retrieved from the onboard memory through the AM FOUP, once the thermal survey is complete.

1.3   Analyzing Data

The data acquired by the ET LT Wafer can be analyzed using the **SensArray Tools**. The **SensArray Tools** software enables you to maximize your fab's wafer yield by capturing real-time tool conditions and identifying the performance characteristics of chambers with the highest yields. You can modify other chambers to match those characteristics, as well as monitor the tools over time, to fine-tune performance.

For more information on the use of the Analysis portion of SensArray Tools, please refer to the Identifying Data to be Analyzed Using a Template / Identifying Data to be Analyzed Using Control Limit.

ET LT wafer performs computations on the acquired data, such as determining the minimum, maximum, mean, range (max-min), and standard deviation of all wafer sensor values for the sample, and logs the results in columns. These computed values are referred to as *calculated* values.

After acquiring, linearizing, and storing the sensor data, you can display or print the data as a line plot graph. In addition, you can display data in a table or as a wafer map (Refer to 5.5Acquiring Data Using the Manual Mission).

2. System Setup

Before you begin working with the ET LT Wafer system, you need to unpack the system components, prepare the equipment for transfer to the Cleanroom, and charge the wafer batteries.

2.1   Before You Begin

There are safety and handling procedures that should be followed. Please read the Cautions and Wafer Handlings provided in this manual and become familiar with the ET LT Wafer before attempting your first thermal survey.

Operating the ET LT wafer outside of its specified temperature range could result in unreliable readings and/or damage to the wafer. The recommended operating temperature for the ET LT wafer is 20 ˚C to 140 ˚C.

Rotational speeds up to 5000 rpm have been tested and found to be safe. While it is possible that even higher rotational speed might be reached without damage to the wafer or spin plate, **SensArray cannot provide any guarantee above 5000 rpm.**

2.2   Wafer Handling Procedures

ET LT Wafer is designed to survive in a semiconductor fabrication environment, care must be taken to prevent damage to the components on the wafer.

⚠️   Wear hand-gloves whenever you handle the wafer.

Hold the wafer by the edges only or support from the backside of the wafer with your hand or with a vacuum wand. In some situations, you may have to grasp the edge of the wafer with your gloved fingers to prevent dropping the wafer, as when you try to insert the wafer into your equipment or AM FOUP.

2.3   Unpacking the System

Inventory all items and compare them to the packing list included with the shipment.

⚠️   Retain all packaging materials for the system. This is required for the return of the ET LT Wafer for repairs.

If any parts are missing or damaged, contact KLA SensArray division immediately. Be prepared to provide a list of the missing and/or damaged components, the Purchase Order Number, and the SensArray Sales Order Number.

Note: Do not return the components without contacting KLA SensArray division and obtaining a Return Material Authorization. You must pack the equipment in the original packing material when returning to KLA SensArray division. Failure to properly pack the components may result in additional damage to the equipment.

2.4   Verifying Wafer Integrity

Make sure the storage case is completely closed. Place the storage case **right side up (electronic module on top)** on a clean working surface. On the front of the electronic module, locate the **red test button** (labeled   as **TEST**) as shown in Figure 2-1. Push the Test Button to activate the system electronics and communication.
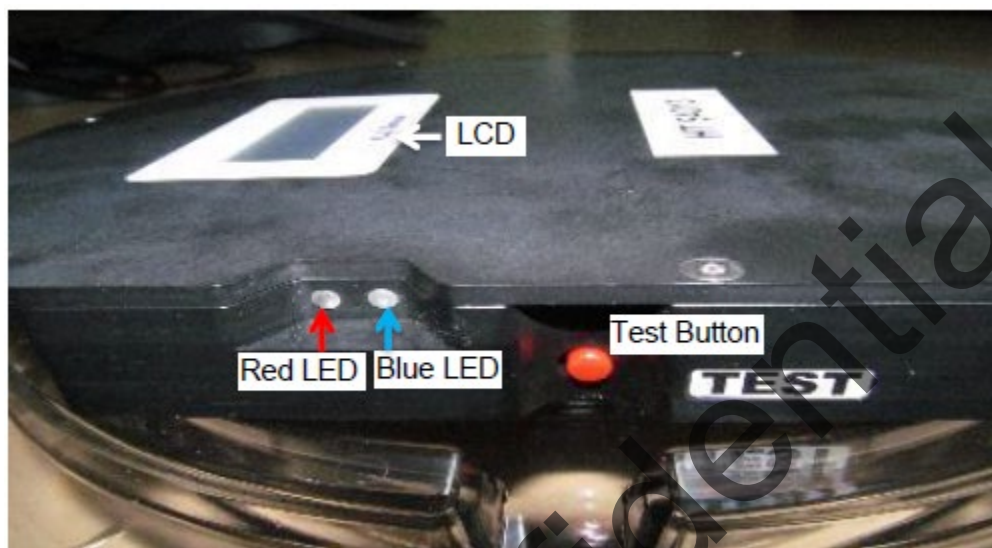

Figure 2-1 Test button and wafer indicator LEDs

Upon pushing the red test button, the LCD Display on top of the Electronic Module displays the following messages:

- **VER** – Storage Case FW (Firmware) version
- **WAFER LOCATED** – when a viable wafer has been found.
- **WAFER S/N** – indicates the serial number of the wafer inside the storage case.
- **WAFER BATT VOLTAGE** – Indicates the current wafer battery voltage.
- **WAFER GOOD** – indicates the completely functioning system.

The LEDs will flash to indicate the following conditions:

- **Flashing Blue LED** – indicates that the storage case received a communication packet from the wafer.
- **Flashing Red LED** – indicates that the storage case is performing maintenance charging of the wafer's battery.

2.5   Removing the Wafer from the Storage Case

The wafer storage case is designed to keep the ET LT Wafer batteries charged to the optimum level for an extended period of 1 to 2 years. It is mandatory to check the status of the batteries and to recharge the batteries when their voltage drops below a threshold.

⚠️ The storage case is not designed to be used to recharge wafers after acquiring data. The storage case may not be used as a carrier station. It is used only to store the wafer when the wafer is not in use.

The wafer should be kept in the storage case until it is needed.

1. Place the horizontal wafer Storage case right side up (electronic module on top) on a clean work surface.
2. To open the storage case lid, place both thumbs on the snap rings on the lid as shown in Figure 2-2.
3. Grab the Left and Right Tabs with your pointer fingers and lift the lid completely.
4. Carefully open the lid of the storage case.
5. Carefully lift the wafer from the storage case.

To replace the wafer into the storage case, follow steps 1 to 3 above to open the storage case. Then carefully place the wafer into the storage case base and close the lid.

⚠️ Before closing the lid, check very carefully that the wafer is correctly placed within the storage case base. Closing the lid while the wafer is positioned incorrectly can break the wafer.
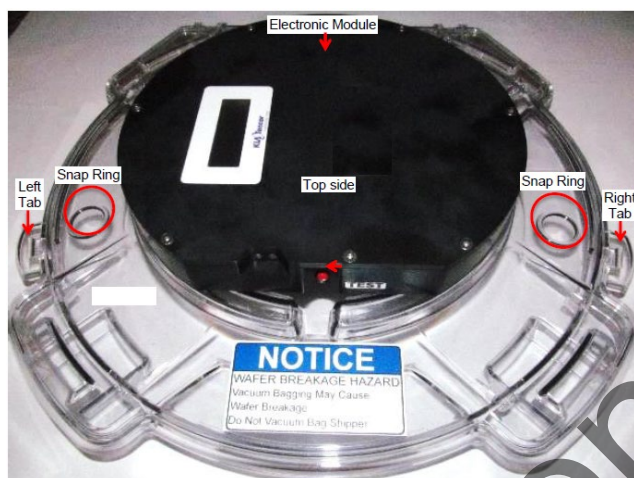

| Figure 2-2 Opening the storage case (Top view) | Figure 2-3 Opening of storage case lid for wafer removal |

To check the wafer health using the storage case, make sure the storage case is completely closed. If the LCD Display on top of the Electronic Module displays **WAFER GOOD**, it indicates the ET LT wafer is healthy. If the wafer is not healthy, the screen will indicate **NO WAFER LOCATED**. If the wafer is present and the module is unable to detect the wafer, place the wafer inside the **AM FOUP** to check the wafer status. If the wafer looks healthy in AM FOUP, then the storage case may have malfunctioned.

Contact KLA SensArray division for technical support.

2.6   Charging the Wafer Before Use

Place the ET LT Wafer into the AM FOUP shipped with the unit to maintain the charge on the internal batteries.
Plug the laptop into the AC power supply and fully charge the laptop battery.

2.7   Setting up the Software

The ET LT Wafer system normally includes a SensArray qualified laptop that has been installed with all the necessary software to set up, run, and retrieve data from the ET LT Wafer.

Note: The ET LT wafer will only work with **SensArray Tools v2.8.12 and above**.

3. Preparing Equipment for the Cleanroom

3.1 Cleaning the Equipment

It is mandatory to follow the industry standards when installing a computer and ET LT Wafer system in the Cleanroom, and wipe down the computer, exterior of the storage case, ET LT wafer, and AM FOUP with Cleanroom wipes dampened with de-ionized (DI) water and/or isopropyl alcohol.

3.2 Cleaning the ET LT Wafer

Significant efforts are made to keep the wafer clean during the manufacturing process. Due to the nature of some processes and demands by customers for cleaner wafers, the ET LT wafer is offered as a cleaned product. It has gone through an SC1 and SC2 cleaning process to remove metals and organics. The cleaned wafer is packed in a clean single polycarbonate storage case until it can be used.

Despite our best efforts, the ET LT Wafer may pick up contaminants from repeated handling. The ideal method of cleaning surface contaminants from the wafer is to blow a gentle stream of Clean Dry Air (CDA) or inert nitrogen across the surface. However, some forms of surface contamination cannot be removed this easily.

The wafer can be cleaned with Isopropyl Alcohol (IPA) (isopropanol/rubbing alcohol) or DI water and a cleanroom cloth. Due to the design nature of the ET LT Wafer, scratches in the coating on the backside of the wafer may exist. This has not been shown to cause degradation in the performance of the wafer.

A gentle stream of DI water or IPA may be used to loosen surface contamination, and then use CDA or inert nitrogen to blow the surface to dry.

⚠️ Never place the wafer in an ultrasonic cleaning bath. The vibration set up by the ultrasonic may damage the electronics inside and render the wafer inoperable.

Note: After a period of usage under etch environment, there will be a deposited polymer ring at the bottom surface of the wafer, this may cause the chucking problem or temperature range is not in specification. Please refer to the application note for the cleaning details for this polymer ring.

3.3 Cleaning the AM FOUP

The AM FOUP can be easily cleaned by wipe down the surfaces with a cleanroom cloth dampened with IPA. No pressure is needed to remove contamination from the surface. Be sure to clean the interior of the AM FOUP. To avoid damage to the ET LT Wafer, clean the interior of the AM FOUP only when the wafer is not present.

3.4 Recharging and Storing ET LT Wafer

The AM FOUP includes removable and rechargeable lithium-ion batteries and the batteries should maintain a charge on the wafer batteries for up to three years. The AM FOUP batteries can be charged via the network cable through the power adapter provided.

⚠️ Keep the wafer inside the AM FOUP when not making thermal surveys. This will help ensure the maximum lifetime for the onboard wafer batteries.

4. KLA AM FOUP

4.1   KLA AM FOUP Function

The KLA AM FOUP transports the instrumented wafer to the equipment during missions. It interfaces between SensArray Tools and SA wafers. It can store mission data for upto 10 hours. It also charges the wafer's battery and used to store the ET LT wafers.

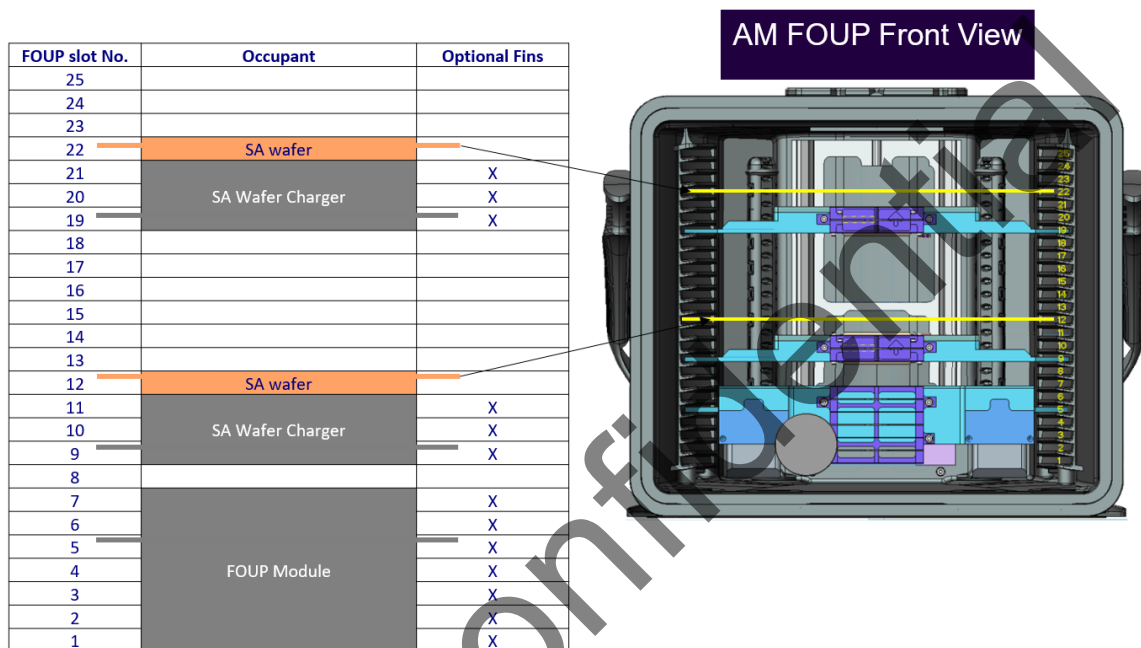The AM FOUP contains, one FOUP module and two SA WF chargers.

FOUP slot No.	Occupant	Optional Fins
25		
24		
23		
22	SA wafer	
21		X
20	SA Wafer Charger	X
19		X
18		
17		
16		
15		
14		
13		
12	SA wafer	
11		X
10	SA Wafer Charger	X
9		X
8		
7		X
6		X
5		X
4	FOUP Module	X
3		X
2		X
1		X

AM FOUP Front View

Figure 4-1 AM FOUP - Front View and Slot Map

4.2   KLA AM FOUP indicators and Controls

AM FOUP indicators and controls are on the rear of the KLA AM FOUP. See Figure 4-2.
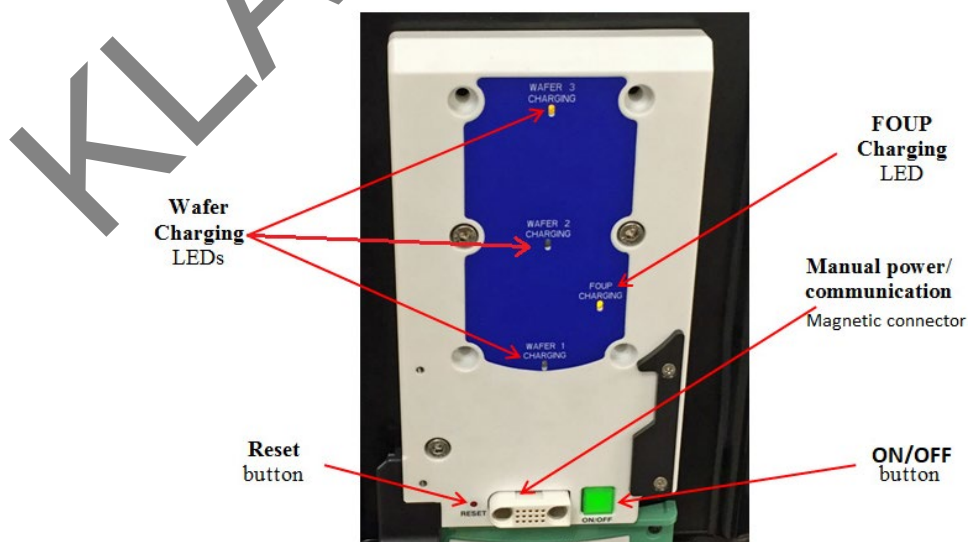
Figure 4-2 KLA AM FOUP indicators and controls

Control or Indicator	Color	Comments
Wafer Charging LED	Green	Blinks when the applicable Wafer is charging
		Steady when the applicable Wafer is present but not charging (Wafer is fully charged)
	Orange	Steady when the applicable Wafer is absent
FOUP Charging LED	Green	Blinks when the FOUP is charging.
		Steady when the FOUP is powered On and at the Station but not charging (FOUP is fully charged)
	Orange	Steady when the FOUP is powered On but is not at the Station
Reset button	N/A	To press the Reset button, insert a thin stylus or pen tip into the hole. **IMPORTANT: Reset the FOUP, only if an error state**
Manual power/ communication connector	N/A	Used to connect a laptop to the FOUP to perform manual missions, or provide power to a FOUP that has not been at the Station for a long time
ON/OFF button	N/A	To power down the FOUP, press and hold the ON/OFF button until the **FOUP Charging LED** turns off

4.3 KLA AM FOUP Battery behaviour

- When an AM FOUP's charge level goes down to 15%, an alarm will send to the host. And the FOUP will not operate at minimal battery level.
- The charging pace of the FOUP is 1% in 4 minutes.
- Whenever the FOUP is off-charging and not in power-save mode, the battery consumption will be 1% for 15 minutes (4-5% per hour).
- For the **Cold Start** condition (FOUP connected to the SAT laptop in OFF mode), the FOUP takes 2 minutes to wake-up and communicate again.
- When the FOUP is on a mission, it will not go to power-save mode until the mission is completed.
- FOUP will not go to power-save mode until reaching **low battery limit**.
- FOUP will switch to power-save mode, when it is idle more than 30 minutes.
- When the FOUP is fully charged, it can stay in stocker or storage for 1 month without charging.

4.4 AM FOUP Battery Charging

- Check the FOUP battery every two weeks, if the FOUP is not in use
- FOUP needs to be charged with a magnetic connector and a power plug connecting to the wall, if the battery power is <85%.

4.5 To Check AM FOUP Battery Level

1. Connect the AM FOUP with Laptop.
2. Open the FOUP Web UI from Google Chrome; Type: http://192.168.10.100:5000.

3. Log in to the FOUP using the following ID and Password:

- You ID = admin

- Password = admin

4. In the FOUP Configuration page, click on **Status**.

5. The battery level will show, as shown in the Figure 4-3.

Figure 4-3 FOUP Configuration

5. Using the SensArray Tools Software

SensArray Tools (SAT) is a software program that communicates with the ET LT Wafer through the AM FOUP. It monitors the status of the system, retrieves data from completed thermal surveys, and set-up the parameters for the next set of surveys.

For setup and using SensArray Tools, refer to the SensArray Tools v2.8.12 user manual.

5.1   Starting the Program

Connect the network cable between the AM FOUP and Laptop. Start the SensArray Tools application by double-clicking the desktop icon.

Figure 5-1 SAT Desktop icon

You can see the **SensArray Tools** (SAT) launcher UI opens as shown in Figure 5-2.
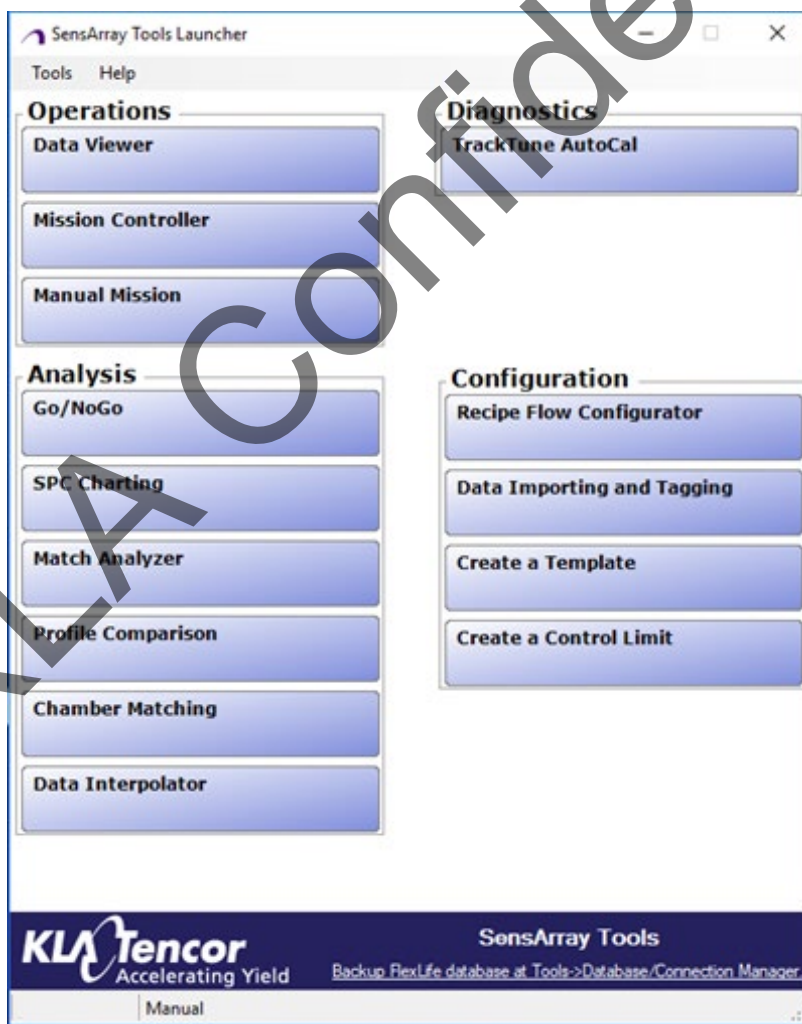
Figure 5-2 SensArray Tools

5.2   Product License at Startup

The computer should come with a license installed. However, an error message dialog will appear (as shown in Figure 5-3) if license upgrade is required. Then click **OK** button.
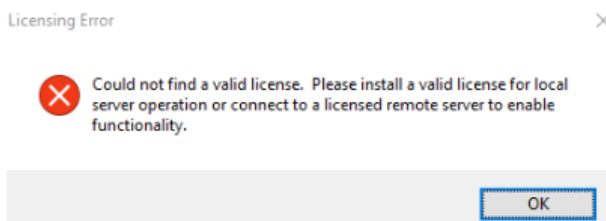

Figure 5-3 License Error Message

To get the Updated License

1. Send the computer's hardware ID to Support Services at customer.support-sensarray@kla-tencor.com. The support team will send you an updated license.

2. Download the save the new license to the desired location.

Use the **License File Manager** option to upload the new license.

To add a new License

1. Click **Tools** on the **SAT** launcher menu bar, then click the **License File Manager** option. You can see the License File Manager window opens, as shown in Figure 5-4.
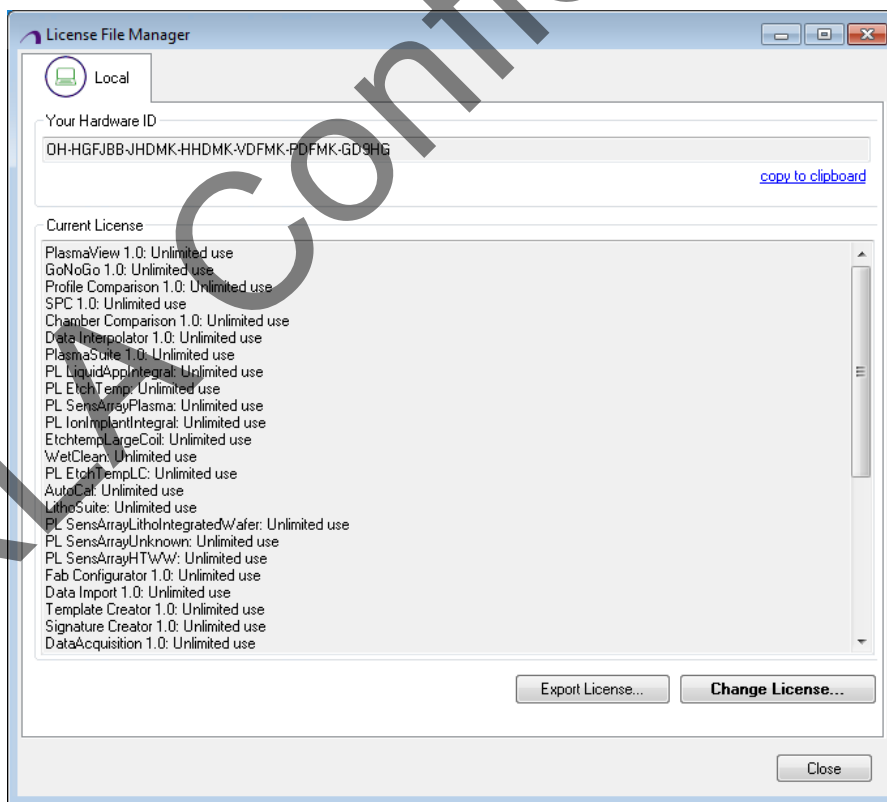
Figure 5-4 License File Manager Window

2. Click **Change License** button. You can see the **License Upgrade Wizard – Add License Form File** window opens, as shown in Figure 5-5.
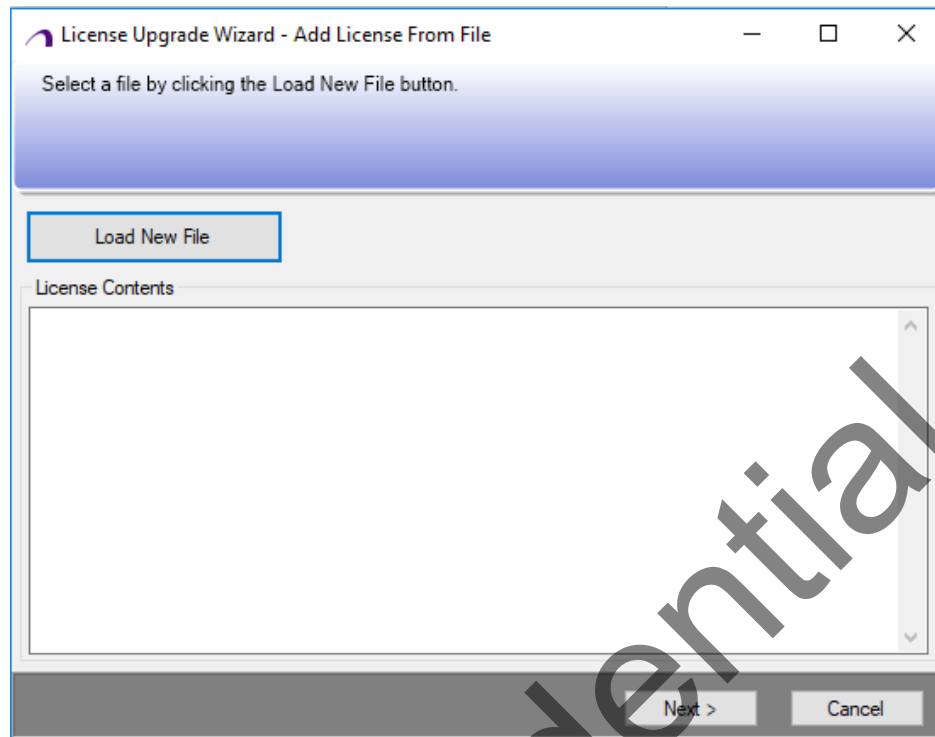

Figure 5-5 License Form File Window

3. Click **Load New File** button. You can see the **Choose the license to load** window opens.

4. Navigate to the saved location and select the new updated license file, then click the **Open** button -or- double-click the new license. The license contents are listed in the License Contents panel.

5. Click **Next >** button. The **License Upgrade Wizard - Confirm License File Change** window opens.

6. Click **Finish** button, then close the **License File Manager** window. The new license is in effect.

5.3   Installing new IWC file

1. Click **Tools** on the **SAT** launcher menu bar, and select the **Wafer Maintenance** option, as shown in Figure 5-6. You can see the Wafer Maintenance Editor Window opens.
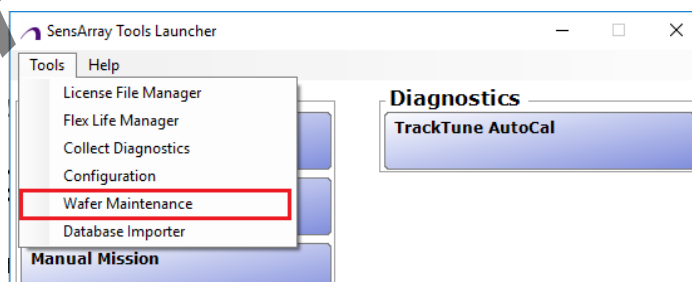

Figure 5-6 SAT launcher window

2. Click **Add Wafer** button to add a new wafer.

3. Enter the **Wafer Name** as required.

4. Click **Browse for Calibration File** button, you can see a window opens.

5. Navigate and select the calibration file (.iwc extension) from the system desired location.

6. Click **Edit Sensor Pattern** button to edit the sensor pattern, if required.

7. Enter **Comment** for the wafer added, if required.

8. Click the **Save** button to add the wafer.

9. You can see the added Calibration File in the Wafer Maintenance Editor Window as shown in Figure 5-7.
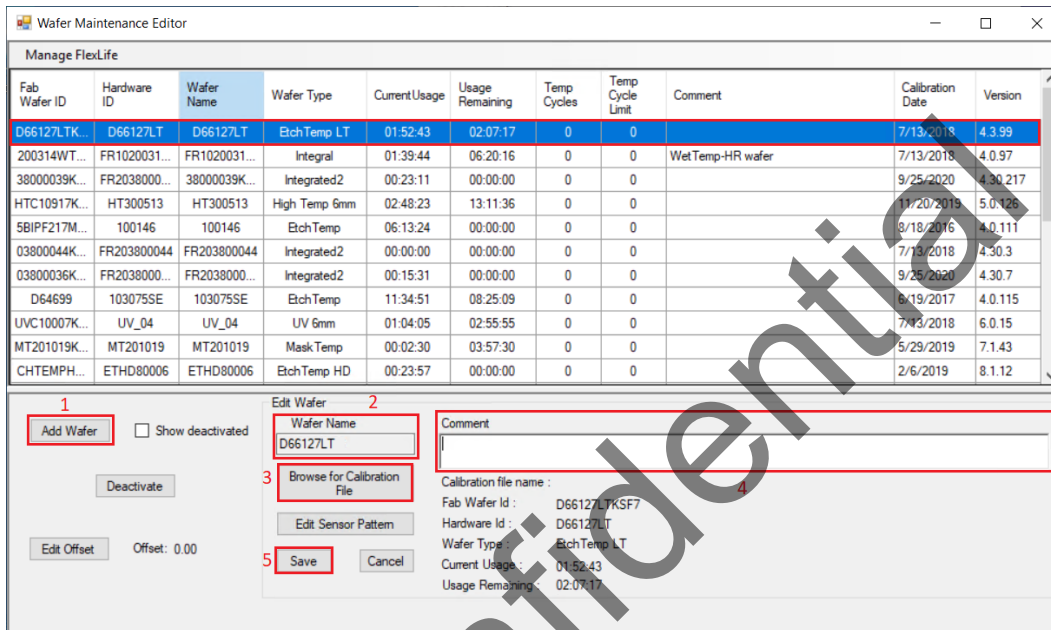

Figure 5-7 Wafer Maintenance Editor window

10.   Do the above steps to add more wafer files in the wafer maintenance editor window.

Note: Refer to SensArray Tools v2.8.12 User Manual, for the configuration setup in detail.

5.4   Initial Setup Phase (Configuration)

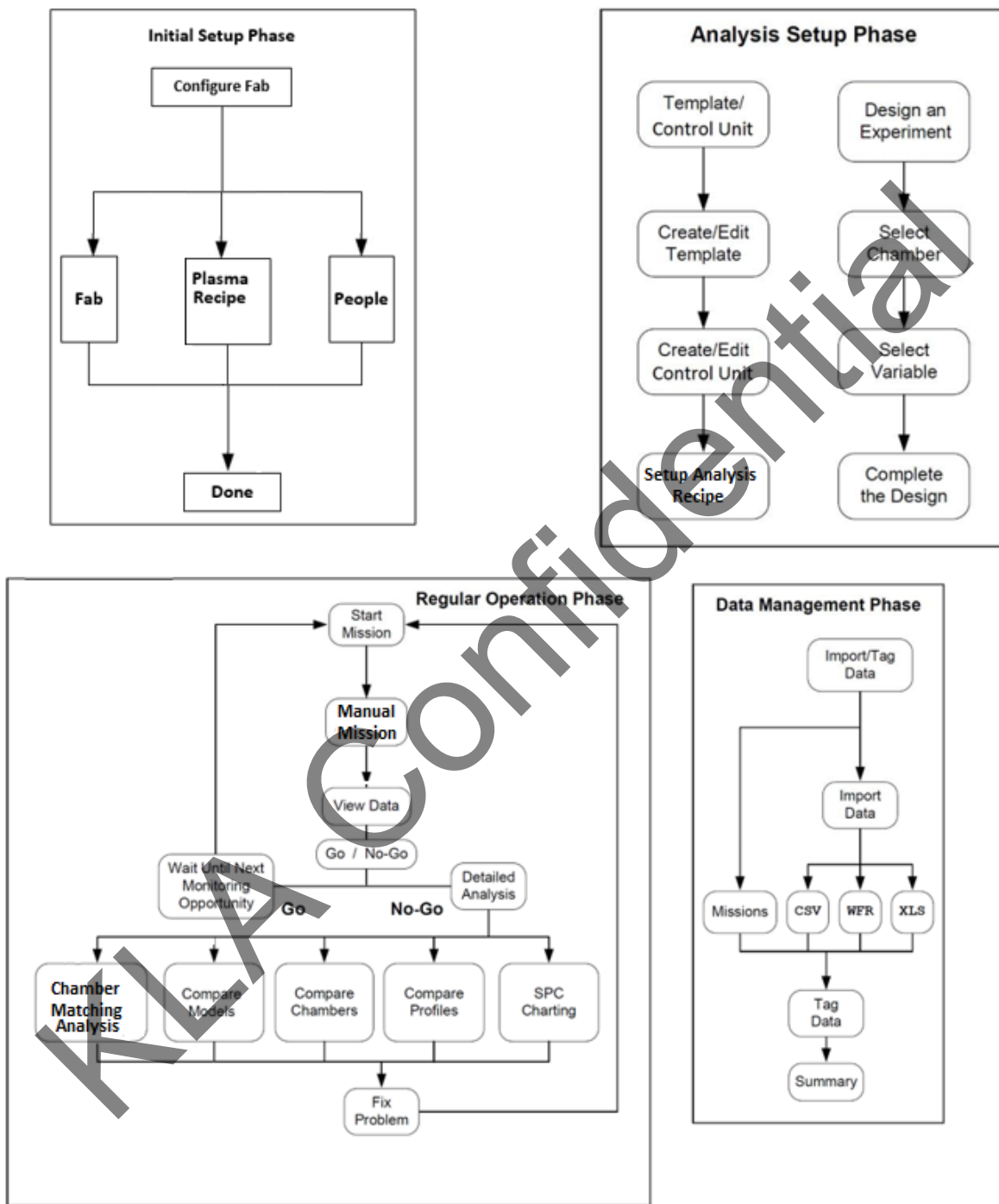The blow flow chart shows the SensArray Tool process flow:

Figure 5-8 SensArray Tools process flow

The initial Setup phase or Configuration involves creating the fab hierarchy, setup the mission recipes used in the fab, and those associated with the fab.

Before using **SensArray Tools** to acquire data for the first time, configure the software for the fab(s) using the following steps:

Step 1 – To Configure the Fab hierarchy

1. Click **Tools** on the **SensArray Tool** launcher menu bar and then click the **Configuration** option, as shown in Figure 5-9.
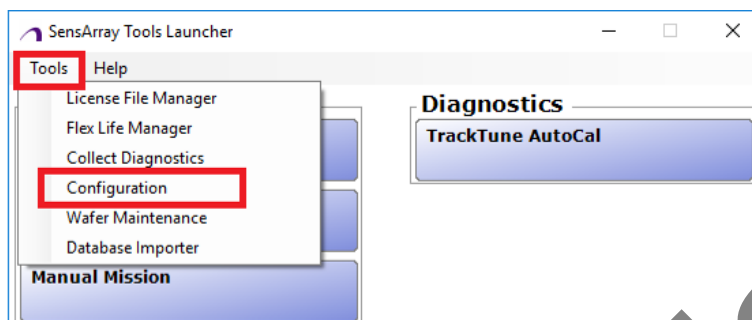

Figure 5-9 SAT launcher Window - Configuration

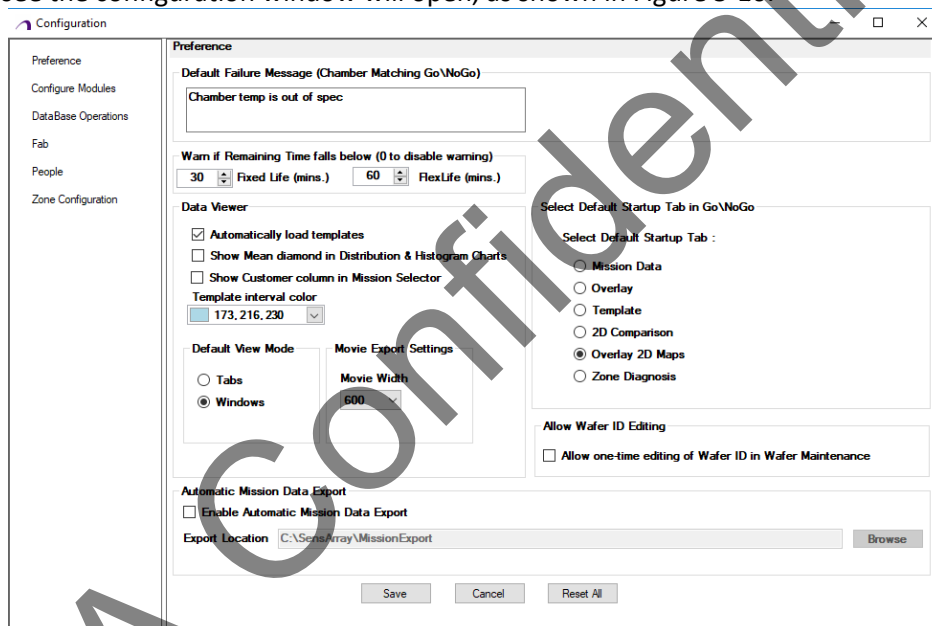2. You can see the configuration window will open, as shown in Figure 5-10.

Figure 5-10 SAT Configuration window

3. Click **Fab** to start configuring the fab.

   Note: The fab hierarchy will empty if this is the first time the **Fab** is being used.

4. Right-click in the blank area and then click the **Add Customer**. The **Customer Information** section opens, as shown in Figure 5-11.
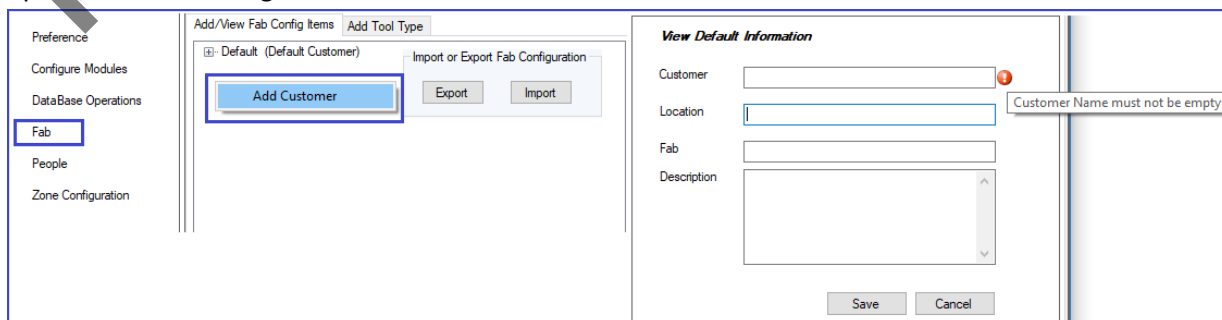

Figure 5-11 To add Customer information

---

5. Enter the **Customer** (mandatory files) name, **Location**, **Fab** name, and **Description**, and then Click **Save** button to add the customer information.

   Note: Customer name should not be left blank. A pop-up message will notify **Customer Name Must not be empty**. **Location**, **Fab** and **Description** are optional.

6. Right-click the newly added customer, then click **Add Tool**. The **Add tool** section opens, as shown in Figure 5-12.

7. Enter the tool **Name** (mandatory field), **Description** of the tool, T**ool Type** and **Bay** information. Click on **Save** to add the new tool.

   Note: Tool name should not be left blank. A pop-up message will notify **Name must not be empty**. **Description** and **Bay** are optional.

8. Select the **Tool Type** as **Plasma** using the drop-down list, and then click **Save** button to add the **Tool** details, as shown in Figure 5-12.
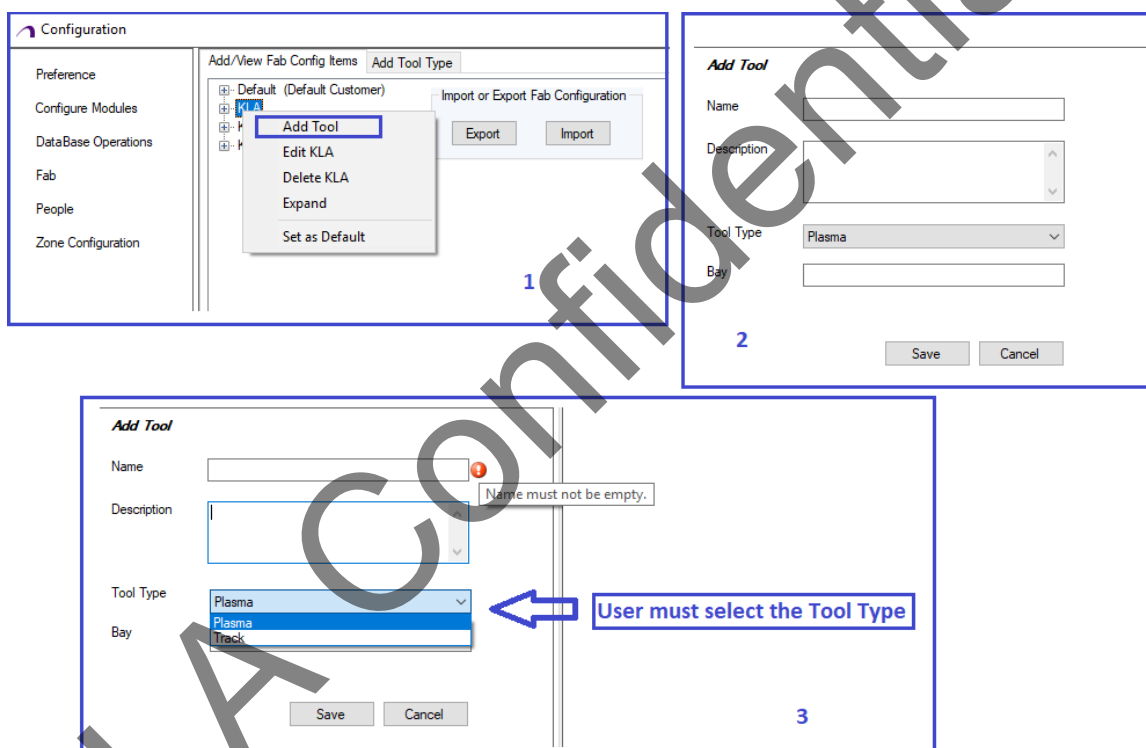

Figure 5-12 To add Tool information

9. If the **Plasma** does not available in the Tool Type drop-down list, click **Add Tool Type** tab to add a new **Plasma** tool type.

10. Click the **Create New Tool Type,** then enter the **Tool Type Name**, **Station Name** and **Tool Type Description** (optional). Click on **Save** to add the newly created **Tool Type**. See Figure 5-13.

11. You can modify the existing **Tool Type** using the **Edit** option. See Figure 5-13.
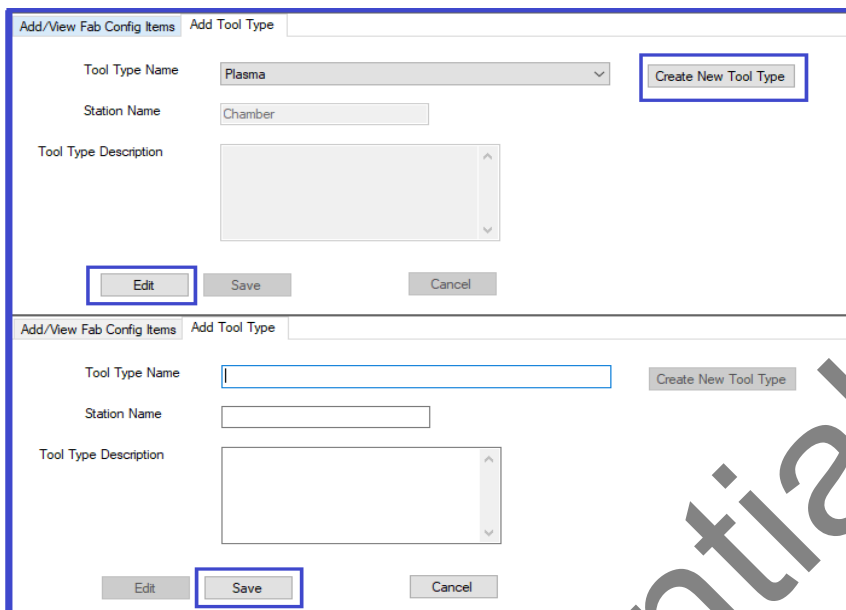
Figure 5-13 To add/edit the Tool type information

12. Right-click on the newly created **Tool** and then click on **Add Chamber** to add a new Chamber. You can see the **Add Chamber** section will open, as shown in Figure 5-14.

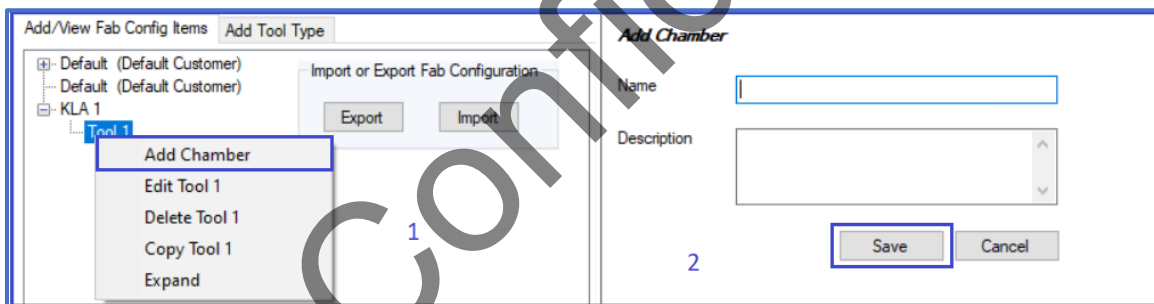13. Enter the chamber **Name** and **Description**. Click on **Save** to add the newly created chamber.

Figure 5-14 To add new chamber

14. Do the steps from 4 to step 13 to add additional tools and chambers, to reflect the equipment present in the fab.

15. You can **Edit** the **Chamber** properties using **Edit Chamber**, if they differ from the tool that was added.

16. Right click on the tool **Chamber**, then click on **Edit Chamber**. You can see the **Edit Chamber Information** section will open, as shown in Figure 5-15.

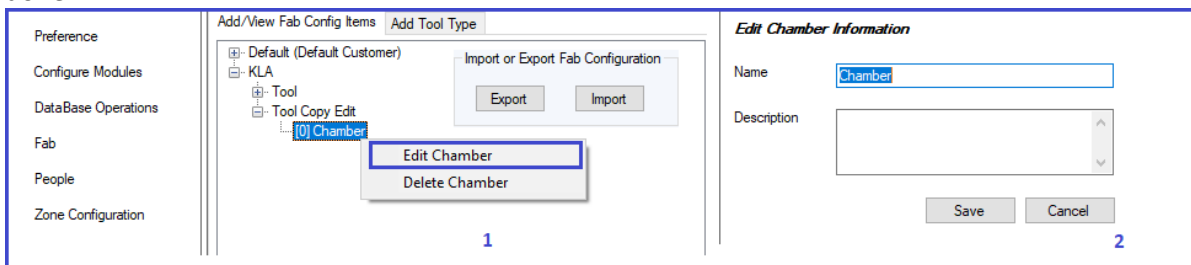17. Modify the Chamber **Name/Description** as needed. Then click on **Save** to save the modification done.

Figure 5-15 To modify the chamber properties

Step 2 – To Associate People with the Fab

After the recipes are associated with chambers, it is necessary to add the people responsible for various aspects of the fab.

To Add a New Person

1. Click **People** from the **Configuration** window. You can see the **People** section will open, as shown in Figure 5-16.
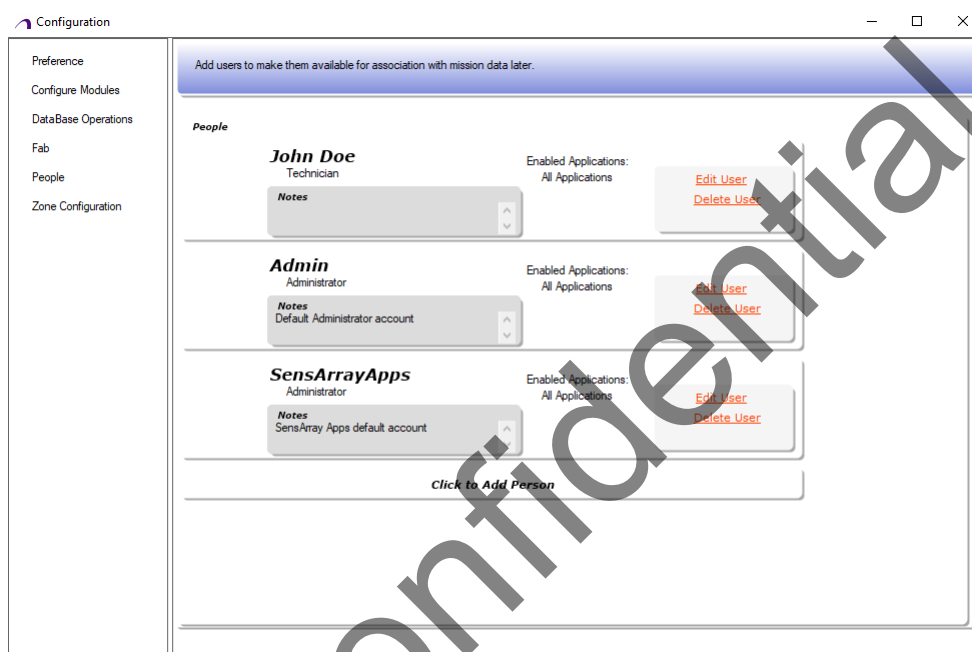

Figure 5-16 Configuration window – People tab

2. Click the **Click to Add Person** button to add a new person. You can see the **Create User** window opens, as shown in Figure 5-17.

   Note: You can **Edit** or **Delete** the existing personnel record.
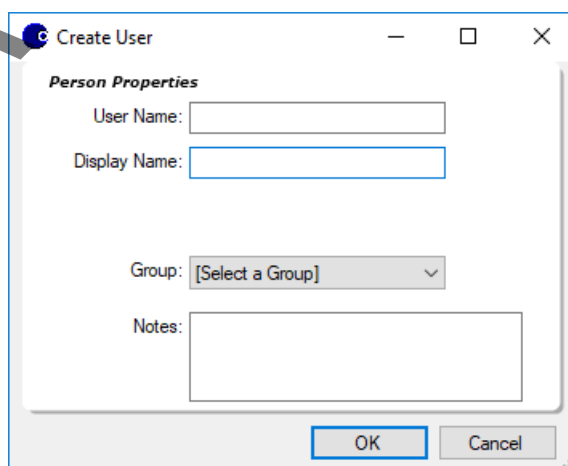

Figure 5-17 Create user window

3. Complete the following information:
   - User Name
   - Display Name

- Notes (optional)
- Group

Group drop-down list options are:

- Technician
- Engineer
- Administrator

4. Click **OK** to add the user once the information entered.

Do the above-mentioned steps, for all individuals who are to use SensArray Tools.

At this point, the initial fab setup process is complete. Proceed to .

Step 3 – To Setup Mission Recipes

It is necessary to setup the mission recipes that are to be used to run ET LT wafers, once the fab is configured.

Click **Recipes Flow Configurator** from SAT launcher UI → **Mission Recipes Tab** window allows the recipes to be entered and organized.

Mission Recipes

1. Click **Recipe Flow Configurator** on the **SAT** launcher UI. You can see the Recipe flow configurator window opens, as shown in Figure 5-18.
2. Click the **Mission Recipe** tab.
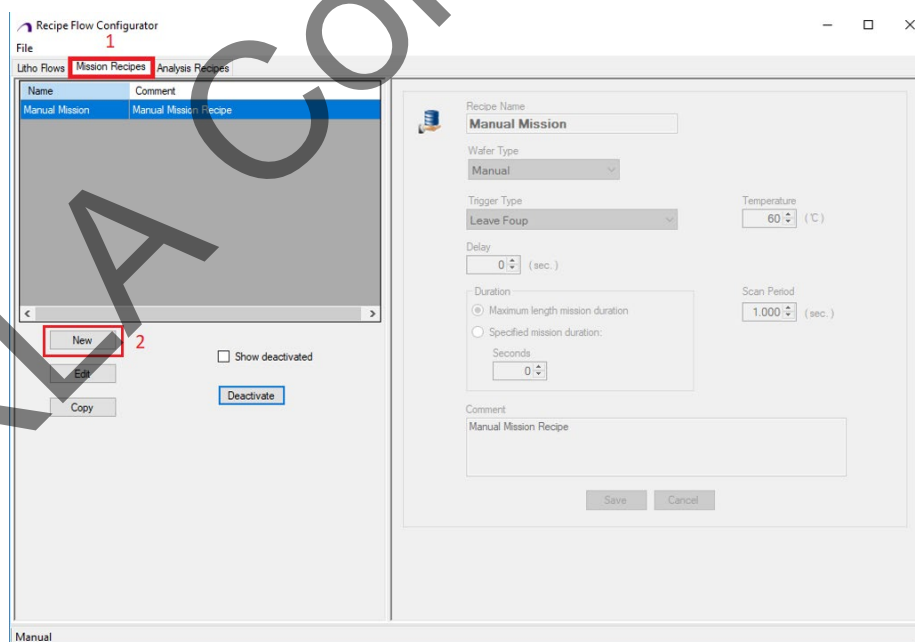3. Click the **New** button to create a new recipe.

Figure 5-18 Mission recipes tab

4. Enter the **Recipe Name,** select the **EtchTemp LT** as a **Wafer Type,** and select the **Trigger Type** using the drop-down menu**.**
5. Click the **Save** button to add the recipe. You can see the created Mission Recipe in the Mission Recipes tab, as shown in Figure 5-19.
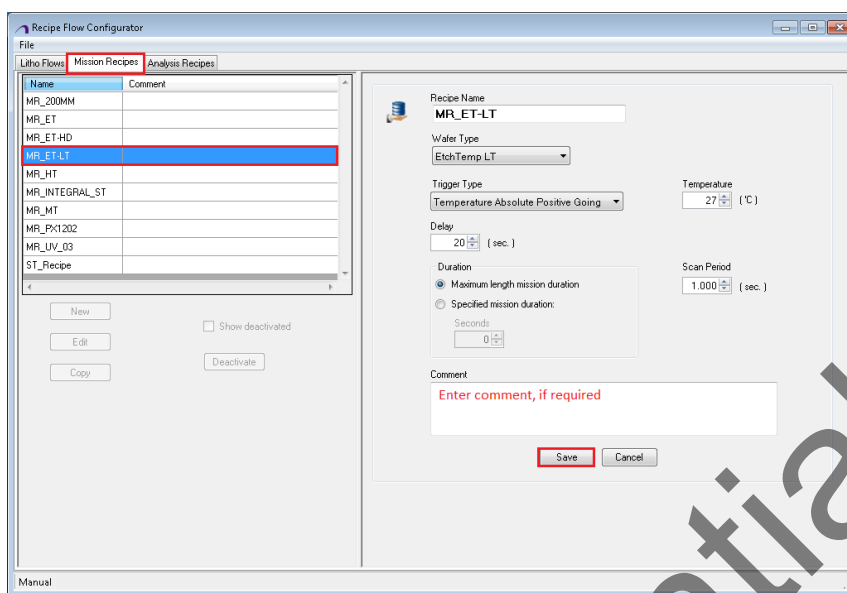
Figure 5-19 To create new recipe

6. You can modify the existing recipes by clicking **Edit** button.
7. You can copy the existing recipe using **Copy** button.
8. Click **Deactivate** to hide recipes.
   Note: Deactivating the recipe(s) will not delete the recipes from the list.
9. Do the steps from 3 to 8 to add more recipe(s).
10. Click on **Edit** to modify the existing recipe(s).
11. you can copy the recipe and its properties by clicking on **Copy** to create a Recipe with different name.
12. Enable **Show Deactivated** to view the list of deactivated recipes, as shown in Figure 5-20.
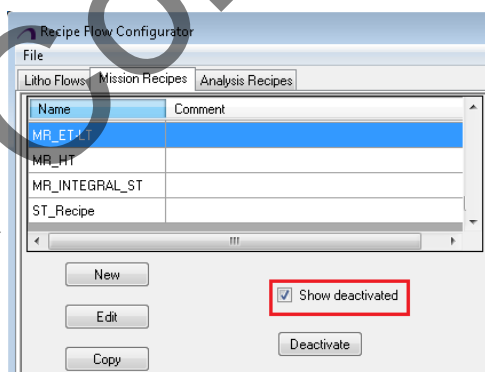
Figure 5-20 To enable the deactivated recipes

5.5   Acquiring Data Using the Manual Mission

The process of acquiring data, using the **Manual Mission** to run a mission, is comprised of the following steps:

- Step 1 - Start the Application
- Step 2 - Run a Mission
- Step 3 - View Mission Data

Step 1 - Start the Application

1. Click **Manual Mission** on the **SAT** launcher UI. You can see the communication window opens, as shown in Figure 5-21.
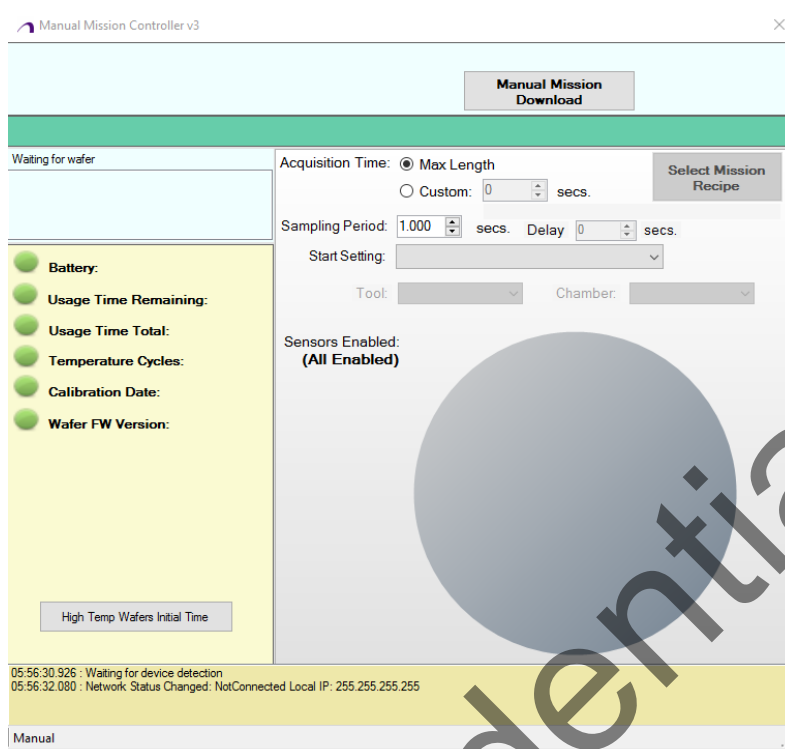
Figure 5-21 Manual Mission Controller window – Waiting for device detection

2. A Laptop should have the SAT Laptop version/ Full setup installed to start with **Manual Mission**.
3. Wafer's .iwc file should be loaded using the **Wafer Maintenance Editor** window.
4. Connect the network cable between AM FOUP and Laptop. The **Manual Mission** communication window will display the wafer map and the device information, as shown in Figure 5-22.
   Note: It will take 30 to 60 seconds to display the information once the ET LT wafer is connected.
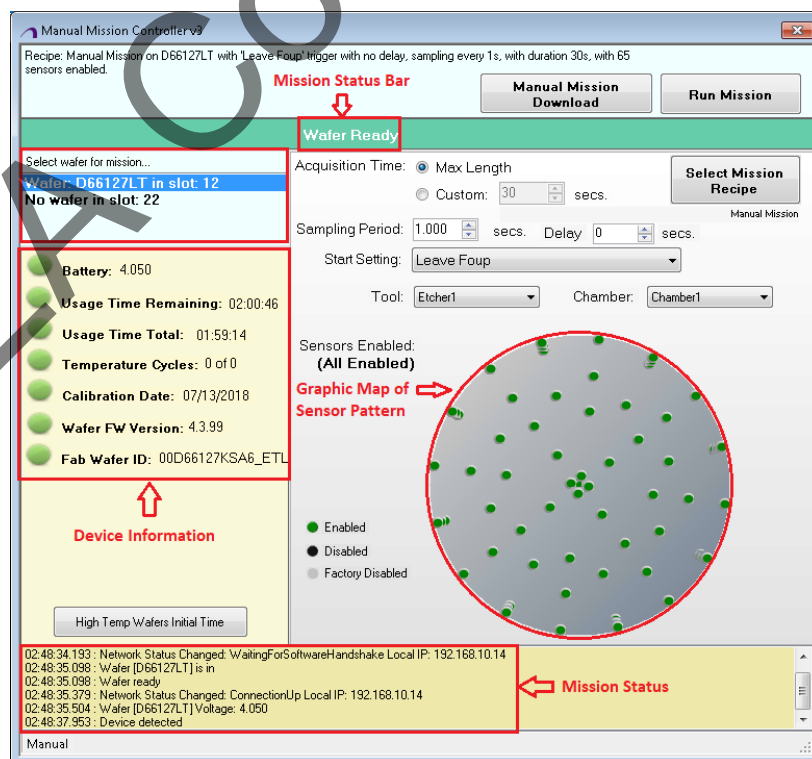

Figure 5-22 Manual Mission Controller window

Proceed to .

Step 2 - Run a Mission

1. Select the ET LT wafer from the **Select wafer for mission...** panel, as shown in Figure 5-22.

2. Click the **Select Mission Recipe** button to add a mission recipe from the **Mission Recipe List**, as shown in Figure 5-23.

Name	Trigger	Duration (sec)	Delay	Threshold	Scan Period (sec)	Wafer Type
MR_PX1202	Leave Foup	60	0	0	1	INtegrated
MR_ET	Leave Foup	max	0	27	1	EtchTemp
MR_HT	Temperature Absolute ...	max	0	0	1	High Temp 6m.
MR_ET-LT	Temperature Absolute ...	max	20	27	1	EtchTemp LT
MR_200MM	Leave Foup	max	60	0	1	EtchTemp

Figure 5-23 Mission Recipe List

Note: The Mission Recipe list shows the pre-setup recipes which are created in Recipe Flow Configurator.

3. Or Enter the below conditions on the mission panel if the Mission Recipe is not created:

   Sampling Period: The Sampling period determines the time, in 1-second increments, for each data sample. For example, 2s equals one sample every 2 seconds, 1s equals one sample every 1 second.

   Acquisition Time: Defines when the data acquisition starts after the launch of a mission. May be set to **Max Length** or **Custom**. **Max Length** results in recording data until the Sensor Wafer memory is depleted. When set to Custom, activates a drop-down box for selecting the number of seconds for mission data acquisition. The minimum custom mission time is 30sec.

   Select the **Start Setting** condition using the drop-down menu**:**

   - **Leave** *FOUP* – Data acquisition starts when the wafer is left from the AM FOUP.
   - **Temperature Transient Bidirectional** – Temperature Transient begins the acquisition of mission data immediately with the change of temperature. (OR) The wafer will start once a temperature change of 0.3 °C/sec is detected (unless there is also a delay). As mentioned above this occurs **before** the delay (if any) has elapsed. The internal CPU temperature is used. Both rising and falling temperatures at the specified rate will cause this to trigger.
   - **Temperature Absolute Positive Going** – When the positive temperature trigger is selected, a temperature drop-down box appears to select the temperature, in +1 ˚C increments, to trigger the start of data acquisition.
   - **Temperature Absolute Negative Going** - When the negative temperature trigger is selected, a temperature drop-down box appears to select the temperature, in ±1 ˚C increments, to trigger the start of data acquisition.

4. Select the **Tool** and **Chamber** using the drop-down menu to tag the mission data.

5. **Make sure the ET LT wafer battery voltage ~4.05V before starting each mission.**

6. Click the **Run Mission** button to start the mission.

7. You can see the **Mission Started** message appears on the top Status Bar, take the ET LT wafer from the AM FOUP, and place the wafer into the processing equipment. In the mission status panel, you can see the **Mission Started** message.

8. **Keep the ET LT wafer at room temperature for few min before it back to AM FOUP.**

9. The data will automatically be downloaded in SAT database and tagged to the selected Tool/Chamber once the wafer is returned from the processing equipment to the AM FOUP.

10. You can see the **Mission Complete** information on the status bar once the data is downloaded in the SAT database, as shown in Figure 5-24.
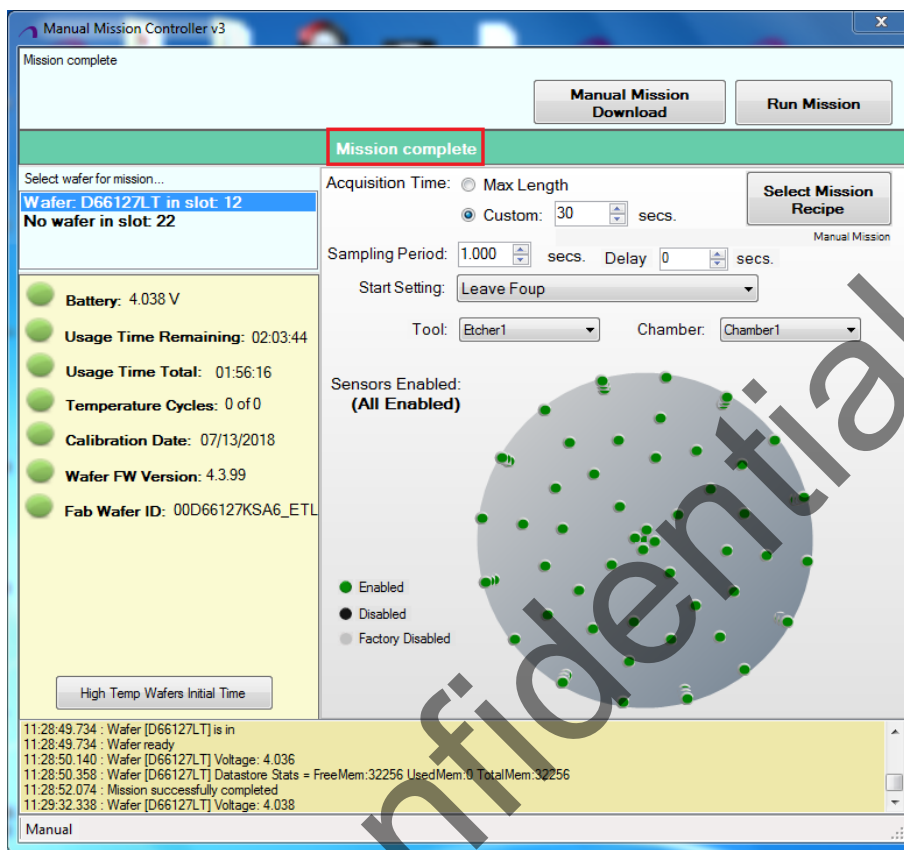

Figure 5-24 Mission Complete window

Proceed to Step 3 - View Mission Data.

Step 3 - View Mission Data

1. Click **Data Viewer** on the **SAT** launcher UI, then select **View Data from Database** (or **View Data** from the **File** menu). You can see the **Mission Selection** window opens.

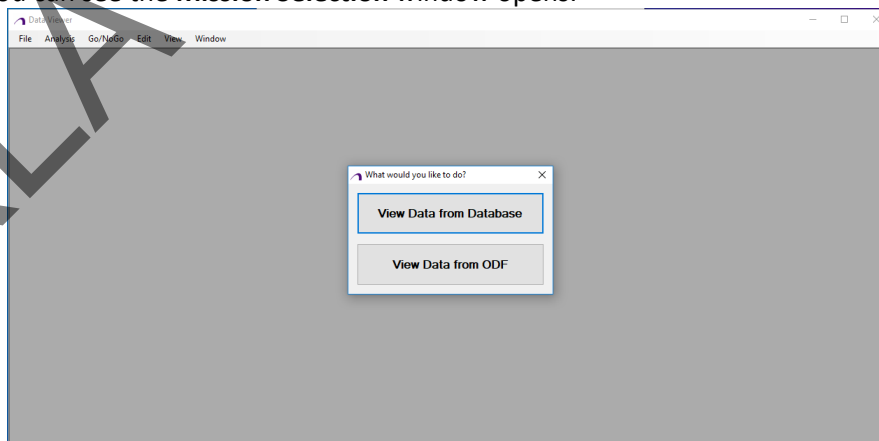

Figure 5-25 Data Viewer Window

2. Select the mission(s) to be viewed and drag it to the **Selected Missions** panel, then click the **OK** button.

3. The selected data will appear in the data viewer window, as shown in Figure 5-26.

Data Viewer

1. The left panel plots the sensor data versus time.
2. You can view the temperature graph at a time, by entering the required time on the line graph **Start Point** (Refer to Figure 5-26).
3. You can view the temperature graph between a time duration, by checking the **Enable End Point** and enter its value.
4. You can view the 2-D map and temperature graph for the required sensor profile using the drop-down list.
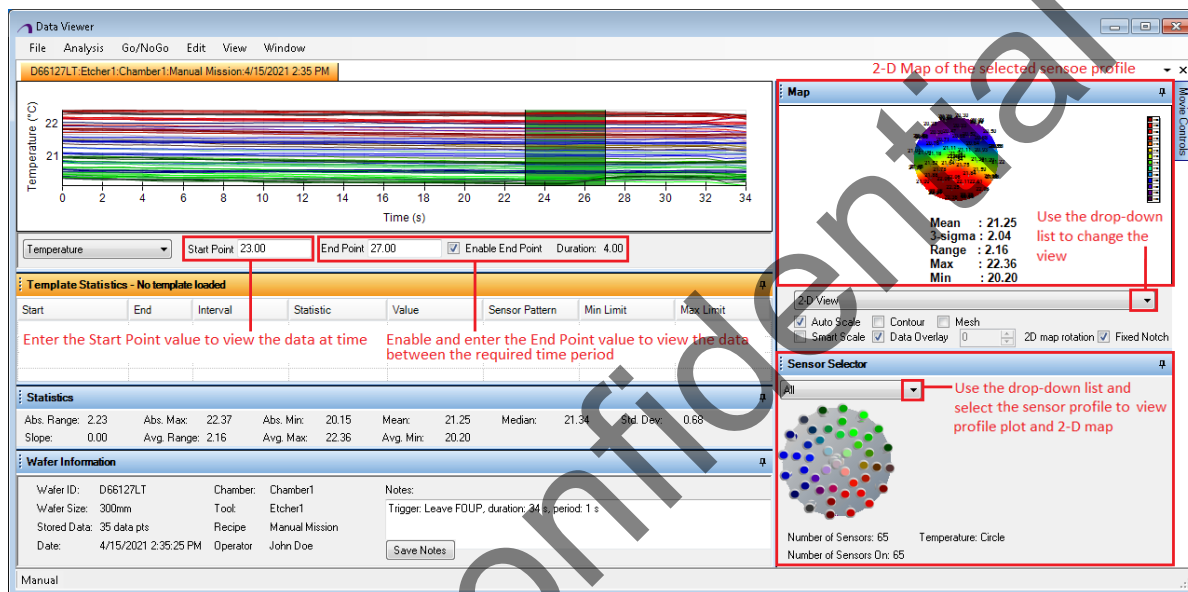5. You can toggle between the 2-D contour map, 3-D, and histogram views using the drop-down.

Figure 5-26 Data Viewer Window

Save or Export Mission Data

The allows you to Save the Mission data (.odf file) and exports the data in a required format.

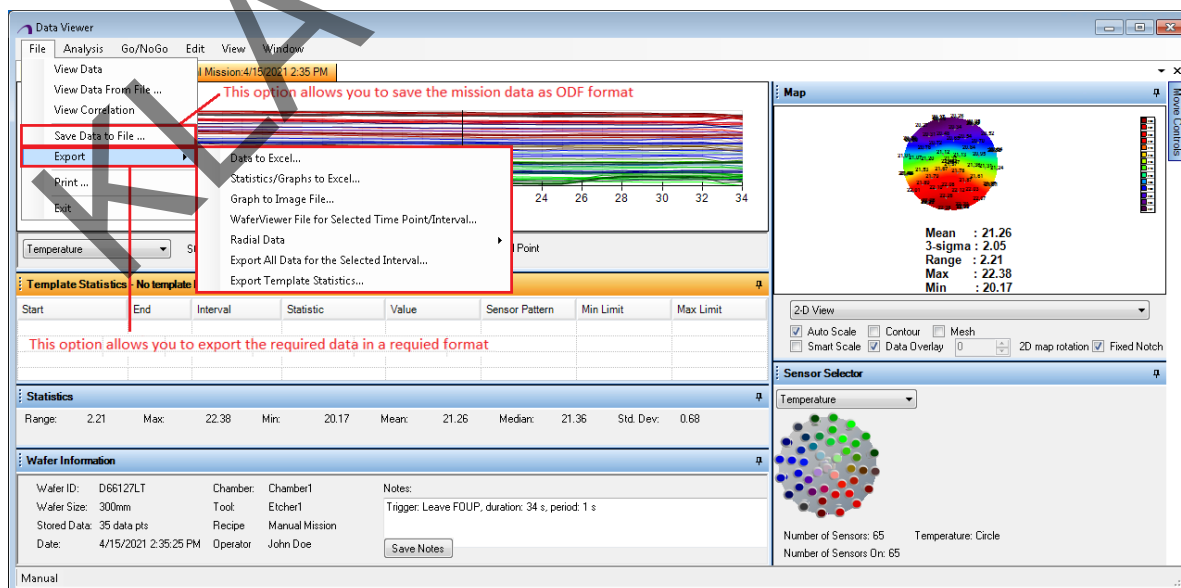1. Click **File** from Data Viewer menu bar and select the required option, as shown in Figure 5-27.

Figure 5-27 Save or Export Raw data

2. Below are the options available in the File menu to Save/Export the data:

- **View Data** - Returns to a Mission Selection window.

- **View Data From File** - Opens the Select an ODF to load window (ODF = OnWafer data file).

- **Save Data To File** - Opens a **Save As** window (.odf file).

- **Export Data To Excel** - Opens the **Export to Excel** window.

- **Export Statistics/Graphs To Excel** - Opens the **Select Information to Include** window.

- **Export Graph to Image File** - Opens the **Save graph to file** window.

Movie Control

You can view and export a movie clip of the selected mission using Movie Control panel and its options.

1. Click the **Movie Controls** tab on right-side of the Data Viewer window. You can see the movie controls panel, as shown in Figure 5-28.

2. You should select the interval limits from the available list or define the intervals by entering the **Start Point** and **End Point** values.

3. Click the **Play** button to view the temperature motion. You can see the movie of the temperature in the graph and 2-D map panel.

4. Click the **Stop** button to stop the movie wherever required.

5. Use the **Step** and **Speed Slide bars** to control the movie.

6. Click the **Export** button to save the 2-D map movie for references.

7. You can see the window to save the movie file (.avi format). Navigate to a desired location and then click the **Save** button to save the movie file.

8. Check the **Include Line Chart** box to export the 2-D movie along with its line chart.
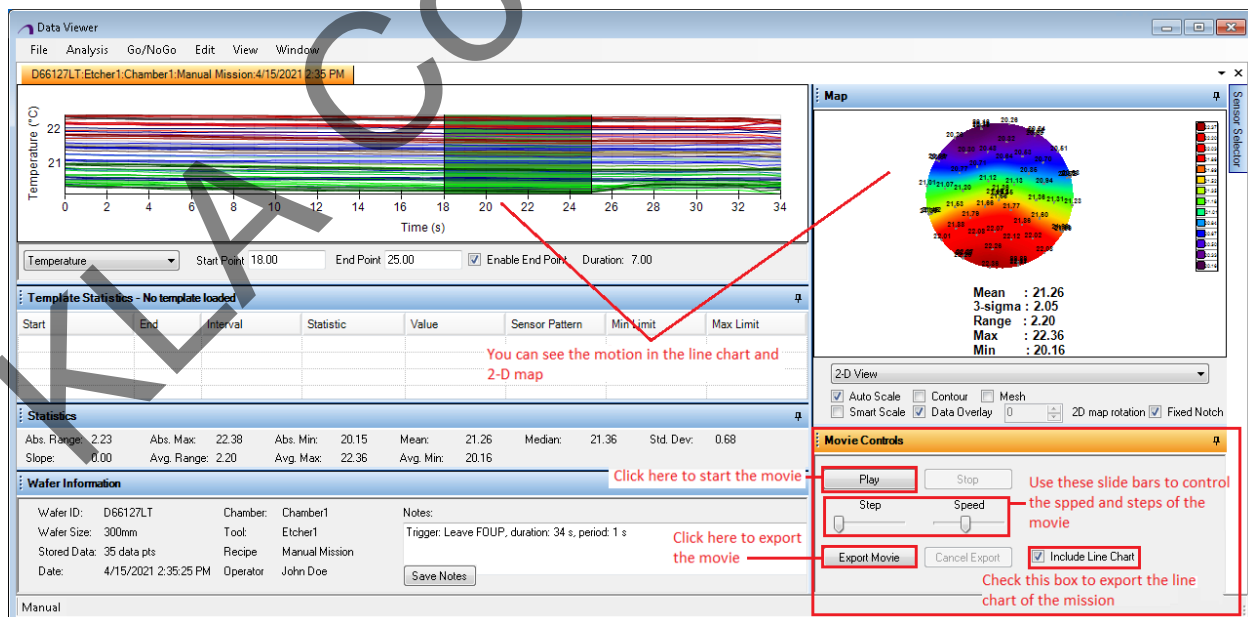

Figure 5-28 Movie Controls

The Data Viewer enables you the following tasks:
- Viewing Data from Previous Missions
- Viewing Data from File

5.6   Viewing Data from Previous Missions

Select **View Data** from the Data Viewer window, to view the data from previous missions.

1. Select **View Data from Database** to view data stored in the database. The **Mission Selection** window opens.

2. Apply various filters in the **Mission Filters** panel, to narrow the search. After a satisfactory selection of missions is viewed, drag one or more missions into the **Selected Missions** panel.

3. Information about the mission(s) is displayed in the **Selected Missions** panel and graphed in the panel below. Click the **OK** button. A **Data Viewer** window for each selected mission opens.

4. The left panel plots the sensor data versus time. To display the data at that time, point as a 2D or 3D graph, click the left panel. To display the data as a histogram, click the right panel.

5.7   Viewing Data from File

1. Click the **View Data from ODF** (OnWafer Data File)**.**
2. You can see the **Select an odf file to load…** window opens, as shown in Figure 5-29.
3. Navigate to the desired folder and select the odf file and click **Open** button.

Figure 5-29 Select an ODF to load window

4. The Data Viewer window will open and shows the odf file data.

5.8   Backing Up and Restoring the SensArray Database

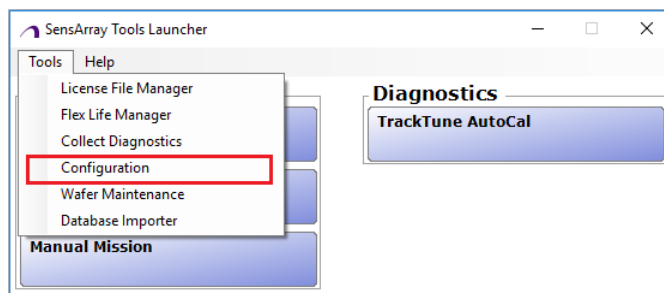1. Click **Tools** on the **SAT** menu bar. Select the **Configuration** and click **Database Operations** option.

Figure 5-30 SAT Tools

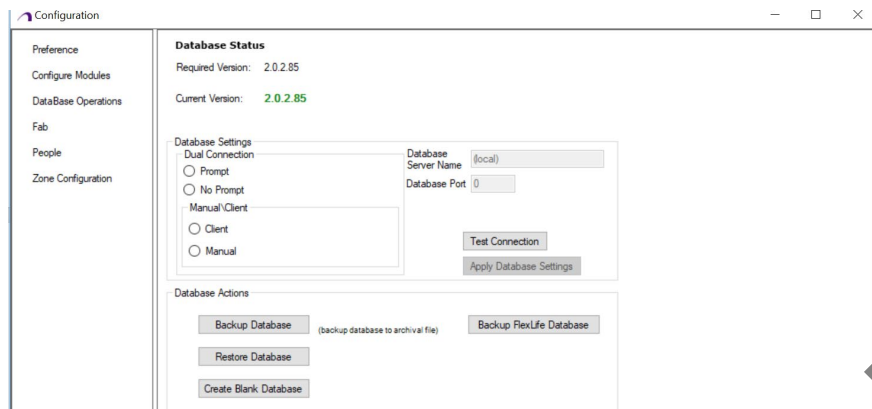2. A Database Operation window will open, as shown in Figure 5-31.

Figure 5-31 Database Operation

3. Click the **Backup Database** tab to back up the current database from the SAT and go to my files to rename the database name.

4. Click the **Create Blank Database** button to create a new database in the SAT. A Warning message will appear on the screen and click **Yes**.
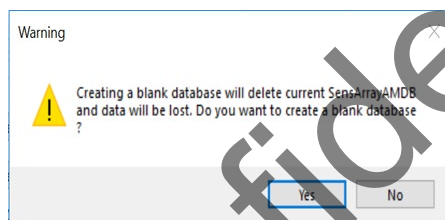
Figure 5-32 Blank Database Warming message

5. A blank database success message will display and click **OK** button to restart SAT program.
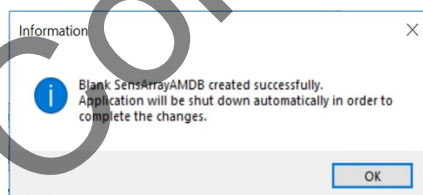

Figure 5-33 Blank Database Success message

6. Click on **Restore Database** to open the previous backup database. Wait for the Database Restore success message appear as shown in the below image.
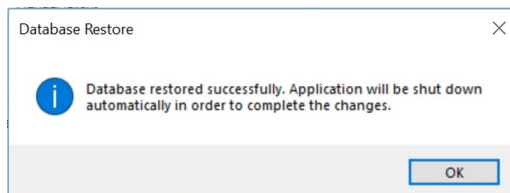

Figure 5-34 Database Restore message

7. Click the **OK** button to restart SAT program.

6. Advanced Data Analysis

6.1   Identifying Data to be Analyzed Using a Template

A template defines the regions of interest within a mission run using a specific recipe. It also defines the important statistics for each region (such as mean, range, and standard deviation). Templates are an important part of **SAT** analysis modules because they are used to extract key information from the raw data. This section is a guide to the template creation process.

The process of identifying data to be analyzed using a template, is comprised of the following steps:

- Step 1 - Create a Template

- Step 2 - Define the Intervals of Interest for this Recipe

- Step 3 - Define the Parameters

Step 1 - Create a Template

1. Click **Create a Template** on the **SAT** launcher UI. You can see the **Create a Template** window opens, as shown in Figure 6-1.

    Note: The **Available Templates** list will empty, and no graph data is displayed, if this is the first time the utility is started.
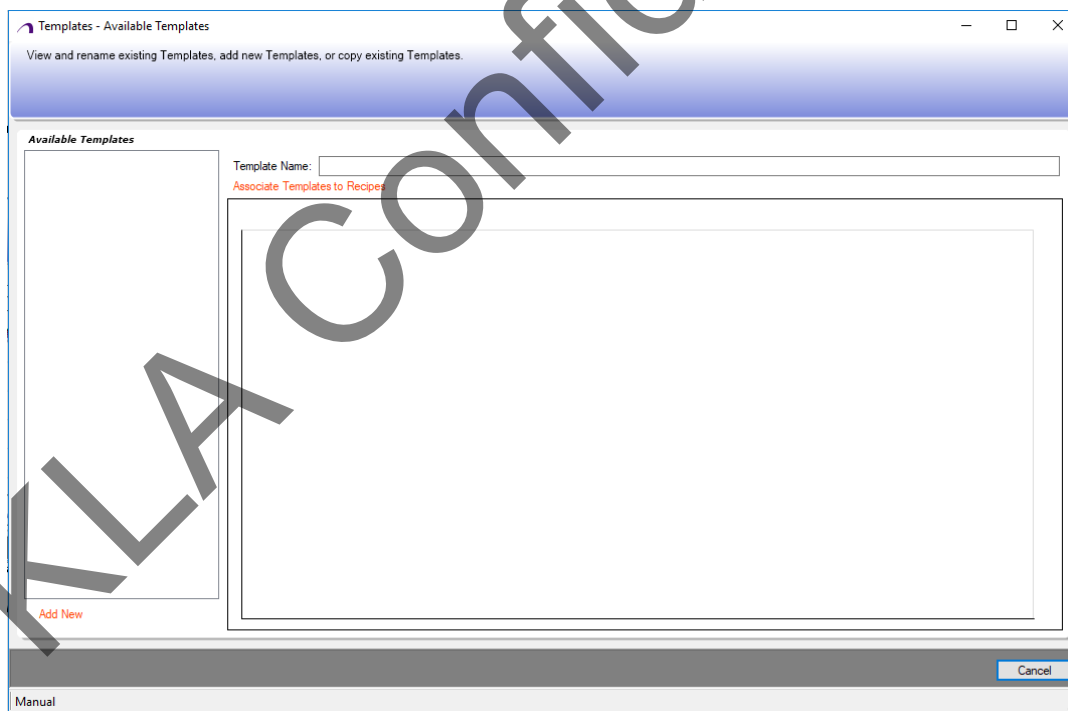

Figure 6-1 Templates - Available Templates window

2. Click **Add New** option to start creating a template, -or- click the **Copy Selected Template** option to copy an existing template. The **Mission Selection** window opens, as shown in Figure 6-2. It allows a choice of reference mission, which should be a good representative of mission data collected using the recipe of interest.
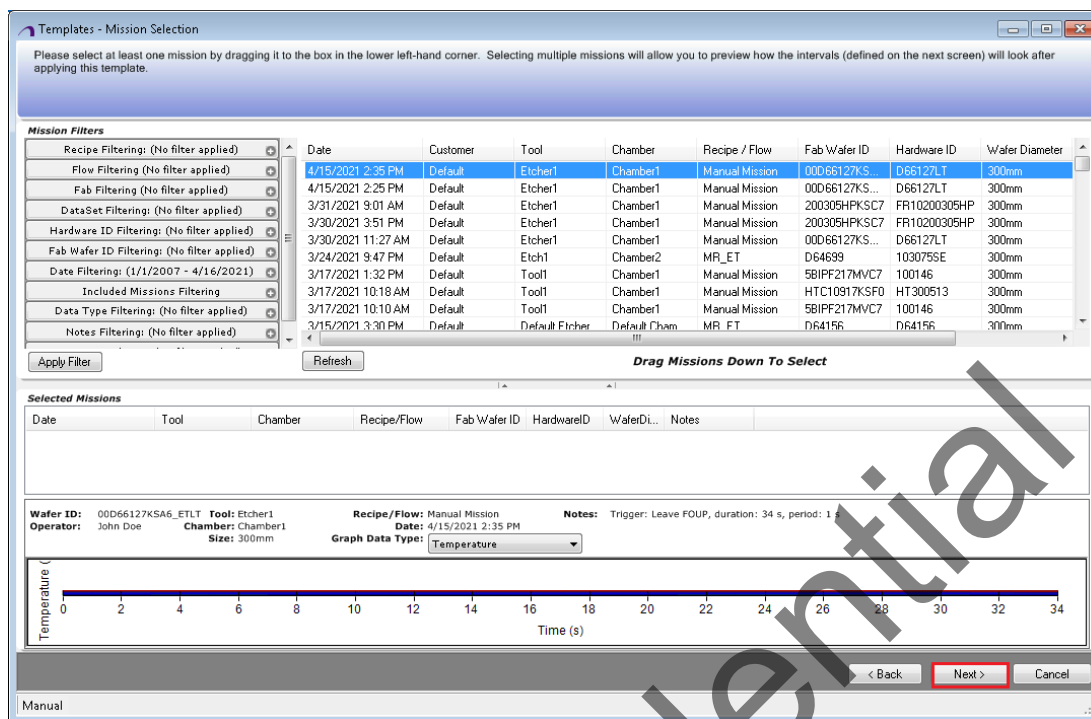
Figure 6-2 Mission Selection Window

3. You can filter the missions by **Recipe**, **Fab**, **DataSet**, **Wafer ID**, **Date**, **Included Missions**, **Data Type**, **Notes**, or **Diameter**, to limit the number of missions from which to select.

Note: More than one mission can be selected for this step, to ensure that the program is able to properly analyze other missions from the same recipe.

4. Drag the selected mission to the **Selected Mission** list.
   TIP: It is not necessary to drag the mission to the **Selected Missions** window when selecting a single mission. Instead, select the mission to be analyzed, then click the **OK** button.

5. Click the **Next>** button after a reference mission is selected. The **Templates – Interval Definition** window opens, as shown in Figure 6-3.

Proceed to .

Step 2 - Define the Intervals of Interest for this Recipe

The intervals of interest are periods of time within the data that contain interesting information. Typically, these are the steady-state portions of the graph, where the data is not significantly rising nor falling.

1. Click the **Add** button to add an interval(s). An interval defines the mission subset to be analyzed.

   TIP: To edit the interval start and end time, change the values in the **Intervals** table or on the graph. To change the values on the graph, click an interval (bordered in orange) to select it. Then press and hold the <CTRL> key while dragging a portion of the interval. Drag the beginning part of the interval to alter the start time. Drag the end of an interval to change the end time. To move the entire interval, drag the middle of the interval.
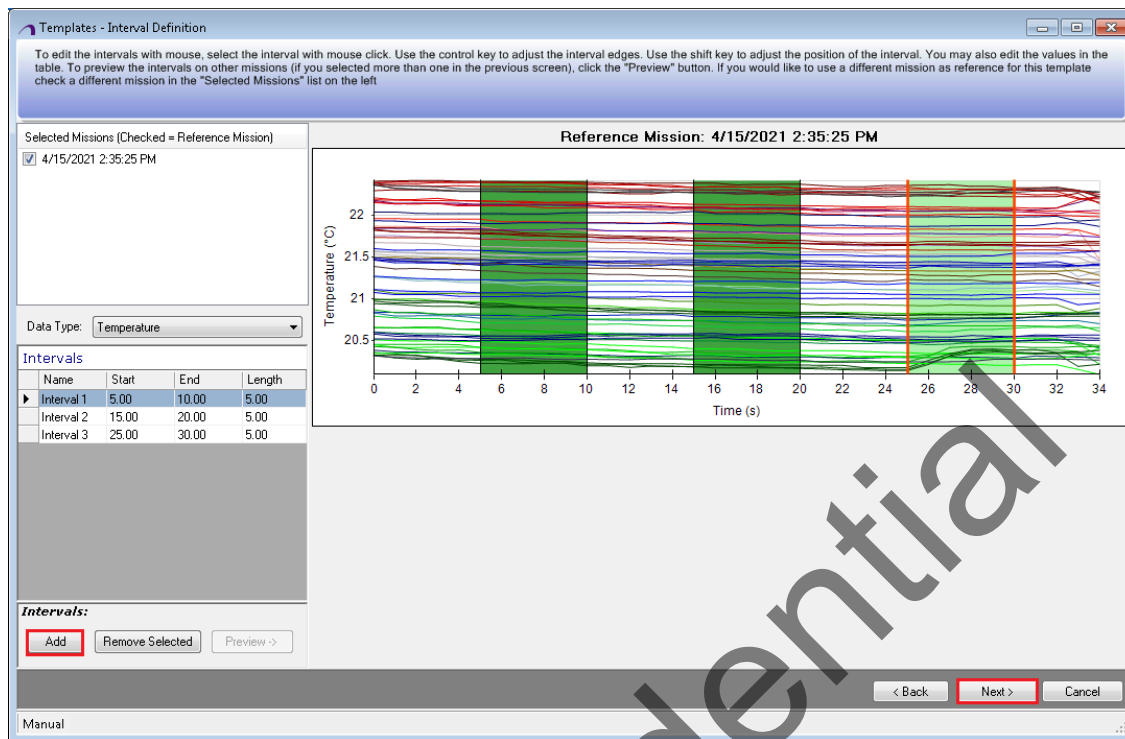
Figure 6-3 Templates - Interval Definition Window

2. Click the **Preview** button to see whether the intervals created are correctly matched in other missions. The preview graphs in the lower-right sector updates with the matching intervals.

3. You can remove an interval by selecting the interval then click the **Remove Selected** button.

4. If the selected intervals are acceptable, click the **Next >** button. The **Templates - Parameter Definition** window opens, as shown in Figure 6-4.

Proceed to Step 3 - Define the Parameters.

Step 3 - Define the Parameters

The final step in creating a template involves defining the values to be extracted from the data inside each defined interval. For example, during the plasma etch step, it may be important to measure the average wafer temperature and cross-wafer range. During this step, these extracted parameters are specified, and the template is named. In addition, these statistics can be extracted from a subset of the sensors, to extract regional information. For example, it may be interesting to extract the mean temperature at the edge of the wafer only, in addition to the entire cross-wafer average.

1. Click the **Add New Parameter** button to add a parameter. A new row appears in the **Interval Parameters** panel with a drop-down list for columns **Interval**, **Statistic**, and **Sensor Pattern**, as shown in Figure 6-4.

Figure 6-4 Templates - Parameter Definition window

2. Select the **Interval** to which the parameter applies.
3. Select the **Statistic** to calculate for the interval (the available statistic options are **Mean**, **3Sigma**, **Max**, **Min**, **Range**, **Median**, **MaxAverage**, and **MinAverage)**.
4. Select the **Sensor pattern**, to select the sensors to use in the calculations (the available options are **All**, **None**, **Outer Ring**, **Inner Disc**, **Mask Edge**, and **New Pattern)**. By default, all sensors on the wafer are used.
   Note: When a sensor pattern is selected, a **Sensor Pattern** window opens. It is possible to edit the selected sensor pattern characteristics or load a different pattern to edit.
5. Enter the **Template Name** as required (on the lower-right of the window), and then click **Finish** button to save the template.
6. A dialog box opens to confirm template creation. Click **Yes** button to confirm.
7. You can see the **Template Wizard** window opens once the template is created.
8. Do the Step 1 - Create a Template, Step 2 - Define the Intervals of Interest for this Recipe, and Step 3 - Define the Parameters to create more templates.

6.2   Identifying Data to be Analyzed Using Control Limit

The **Control Limit** allows limits to be associated with a template, to indicate the expected values for the calculated statistics. *For example*, if a recipe template calculates the mean of a steady-state period, the **Control Limit** for that template would specify the minimum, maximum, and average values expected for that mean.

The process of identifying data to be analyzed using the **Control Limit**, is comprised of the following steps:

- Step 1 - Create a Control Limit

- Step 2 - Create a DataSet

- Step 3 - Verify and Complete the Control Limit

Step 1 - Create a Control Limit

1. Click **Create a Control Limit** on the **SAT** launcher UI. You can see the **Control Limit Editor Wizard - Create or Edit** window opens, as shown in Figure 6-5.
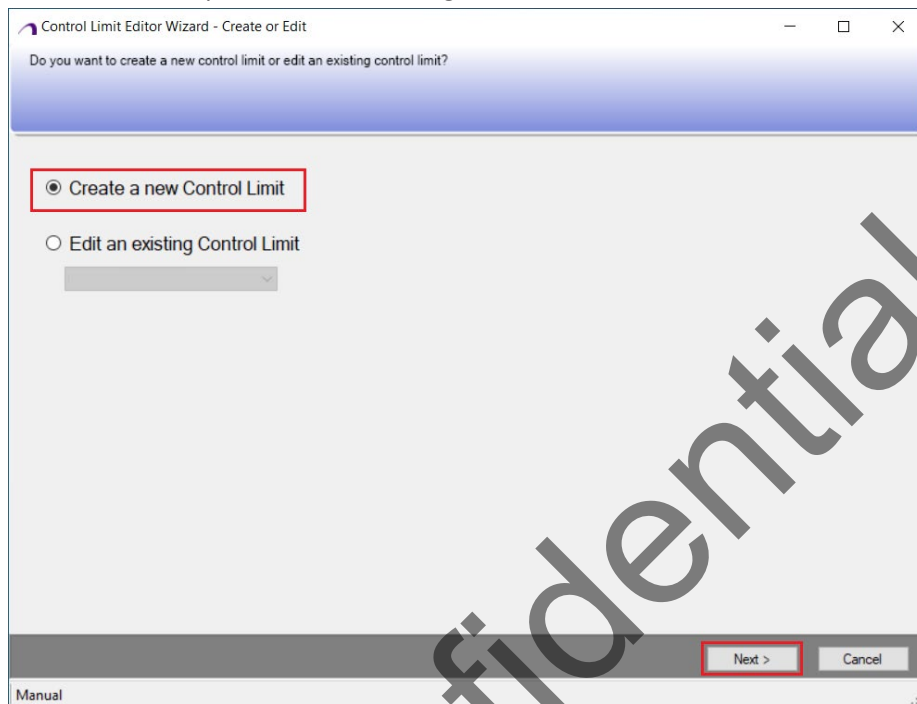

Figure 6-5 Control Limit Editor Wizard - Create or Edit window

2. Select the **Create a new Control limit** or **Edit an existing Control limit**, and then click the **Next >** button.

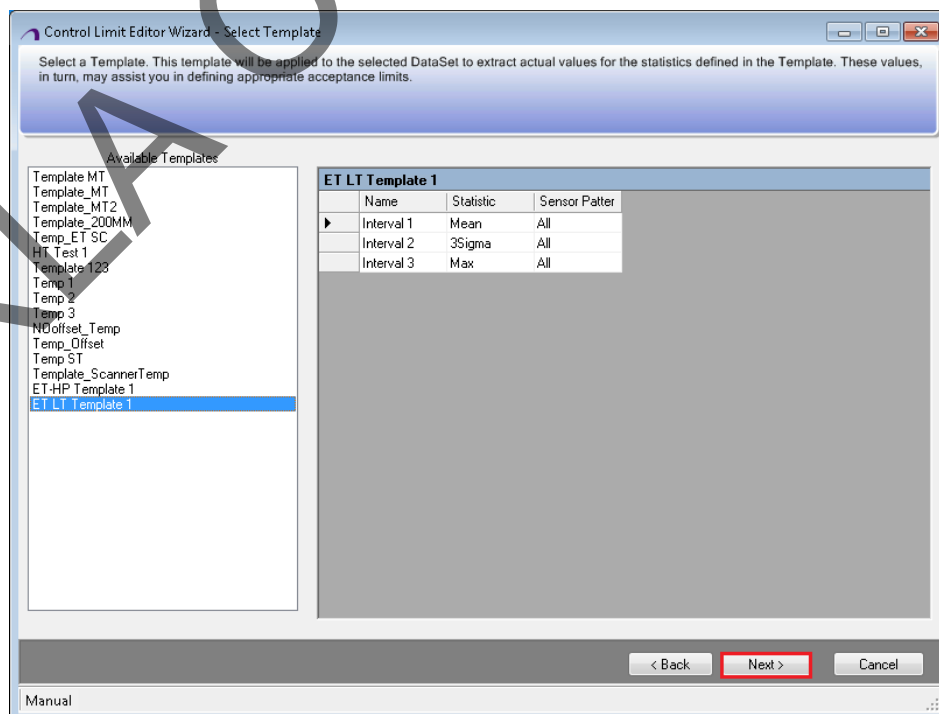3. You can see the **Control Limit Editor Wizard - Select Template** window opens, as shown in Figure 6-6.

Figure 6-6 Control Limit Editor Wizard - Select Template Window

4. Select the required template from the **Available Templates** list, for which the control limit is to be created. Click the **Next >** button, you can see the **Control Limit Editor Wizard - Define Acceptance Limits** window opens, as shown in Figure 6-7.
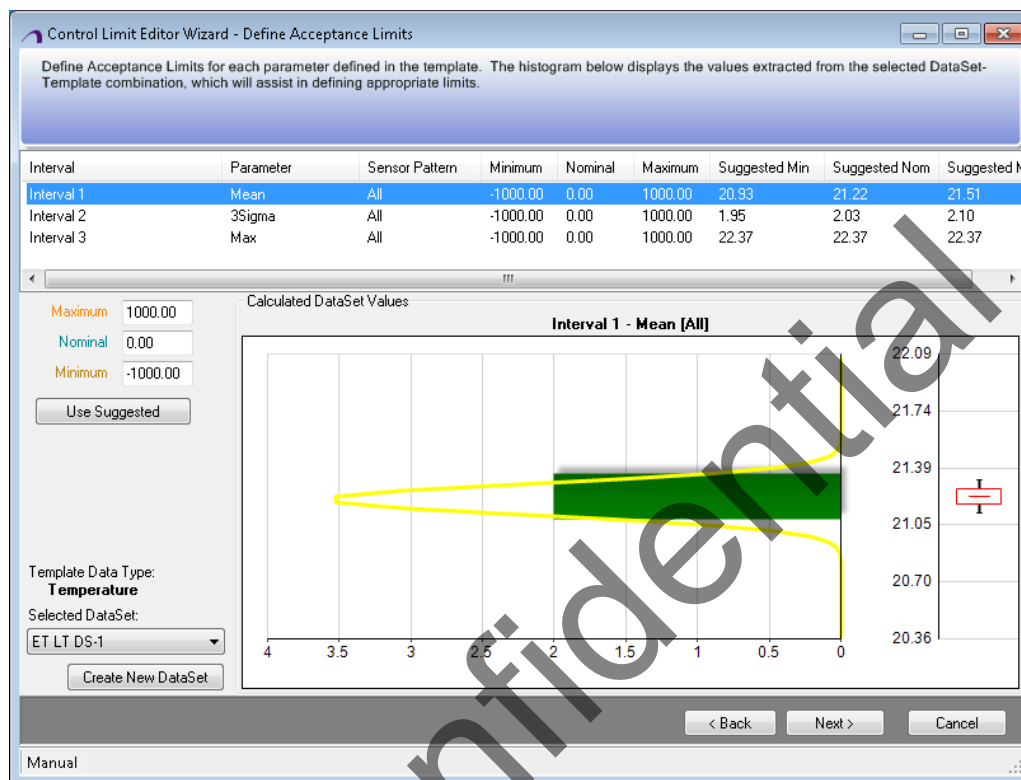

Figure 6-7 Control Limit Editor Wizard - Define Acceptance Limits window

5. Define a collection of missions for the program to generate a suggested set of limits.

Proceed to Step 2 - Create a DataSet.

Step 2 - Create a DataSet

1. Click the **Create New DataSet** button. The **Create DataSet** window opens.
2. Select a set of missions that reflect a standard running conditions for the recipe. Enter a dataset name, then click the **Save** button to return to the **Control Limit Editor** Wizard – **Define Acceptance Limits** window.
3. Select the created dataset from the drop-down list, to ensure it is selected.
    Note: Refer to **SensArray Tools v2.8.12** User Manual to know how to create **DataSet**.
4. Examine each parameter and assign a maximum, nominal, and minimum value, to define the acceptance limits for the control limit.
5. Click the **Use Suggested** button to use the suggested values calculated from the dataset, as shown in Figure 6-8.
6. Click the **Next >** button.
7. You can see the **Control Limit Editor Wizard - Summary** window opens, as shown in Figure 6-9.
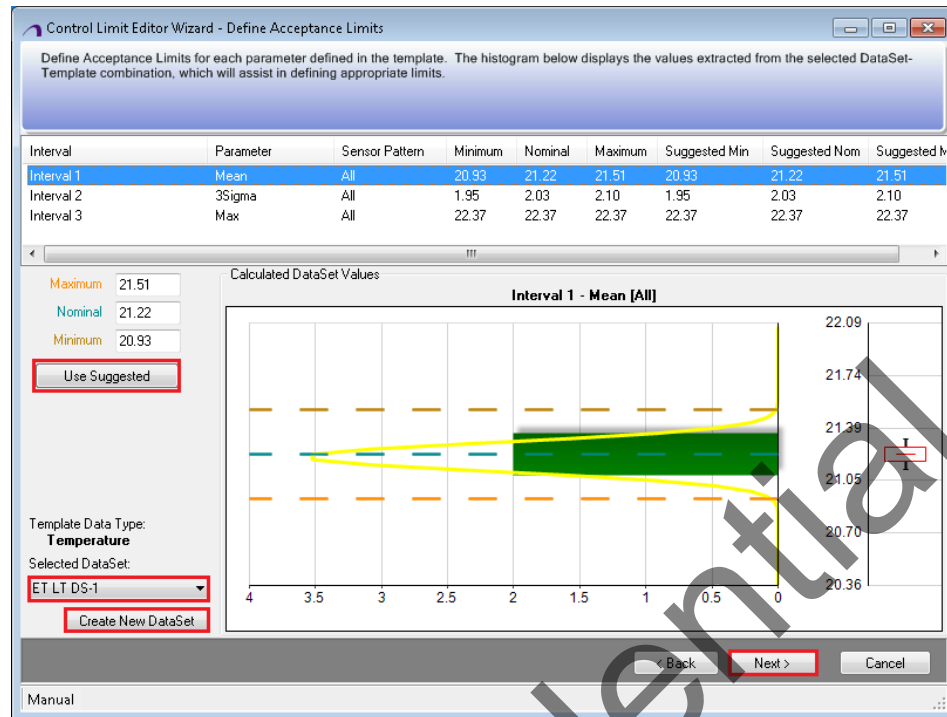
Figure 6-8 Control Limit Editor Wizard – To set parameter values

Proceed to Step 3 - Verify and Complete the Control Limit.

Step 3 - Verify and Complete the Control Limit
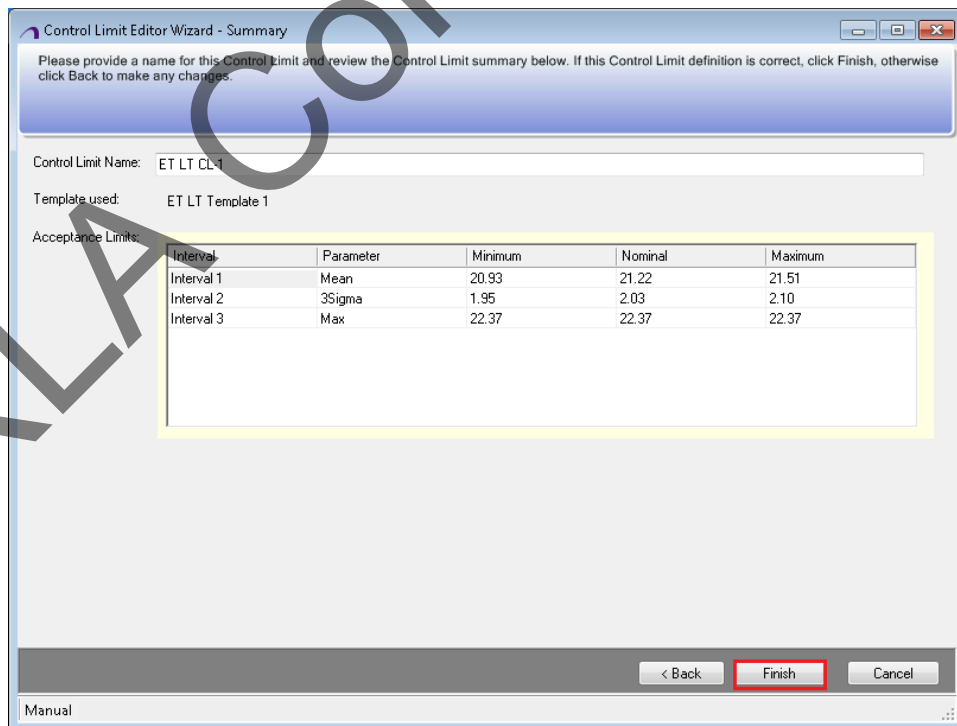
1. Enter the **Control Limit Name**.

Figure 6-9 Control Limit Editor Wizard – Summary

2. Click the **Finish** button to save the **Control Limit.**
3. The **Control Limit Editor Wizard** - **Summary** window closes, and the **SensArray** launcher UI opens.

6.3   To Set up Analysis Recipes

Analysis Recipes are mainly used for automation and Chamber Matching. Follow the below mentioned procedure to setup the **Analysis Recipes**:

1. Click **Recipe Flow Configurator** on the **SAT** launcher UI. You can see the Recipe flow configurator window opens, as shown in Figure 6-10.
2. Click the **Analysis Recipes** tab.
3. This **Analysis Recipe** tab allows you to create a **New r**ecipe, **Edit** the existing recipes, **Copy** the recipe and to view the **Deactivated Recipes**.
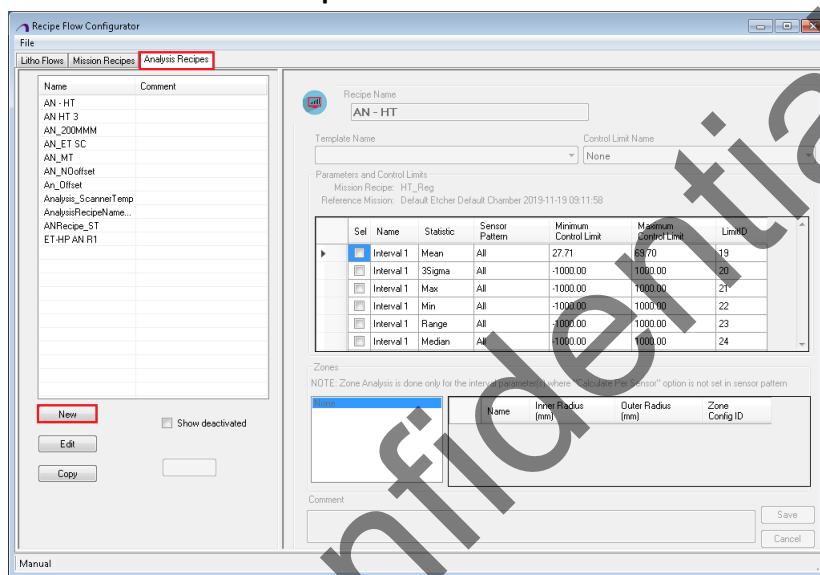
Figure 6-10 Analysis recipes window

4. Click the **New** button to add a new Analysis recipe.
5. Enter the **Recipe Name** and select the **Template Name** and **Control Limit Name** using the drop-down menu. Select the **Zones** if required.
6. Click **Save** button to add the analysis recipe.
7. You can see the newly created analysis recipe in the **Analysis Recipes** list, as shown in Figure 6-11.
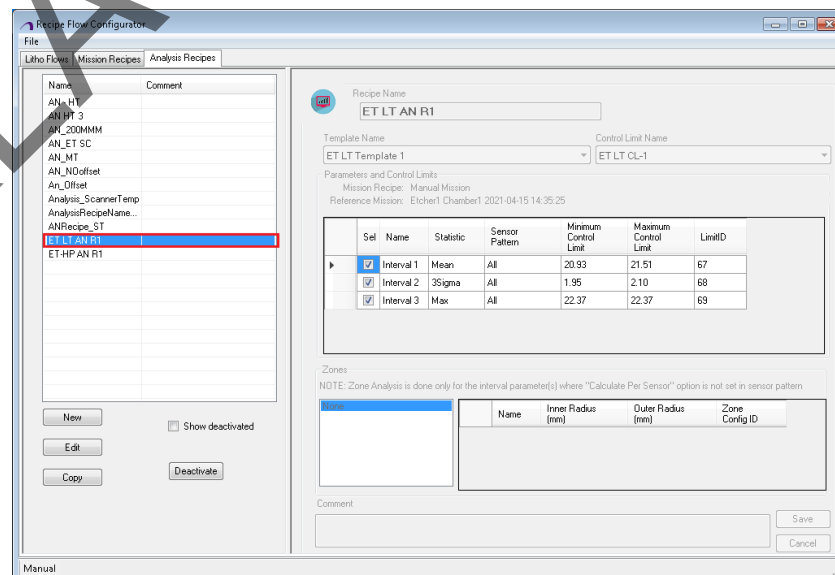

Figure 6-11 To create new analysis recipe

8. You can edit the existing recipe by clicking on **Edit** and You can copy the recipe and its properties by clicking on **Copy** to create a recipe with different name.
9. Enable **Show Deactivated** to view the list of deactivated recipes.

6.4   Go/No-Go - Validating Process Readiness

This module allows you to quickly determine whether the process is within specification or not. To analyze missions with Go/No-Go, a **Template** and **Control limit** must be defined for the mission to analyze.

1. Click **Go/No-Go** on the **SAT** launcher UI. You can see the **Go/No-Go** window opens, as shown in Figure 6-12.
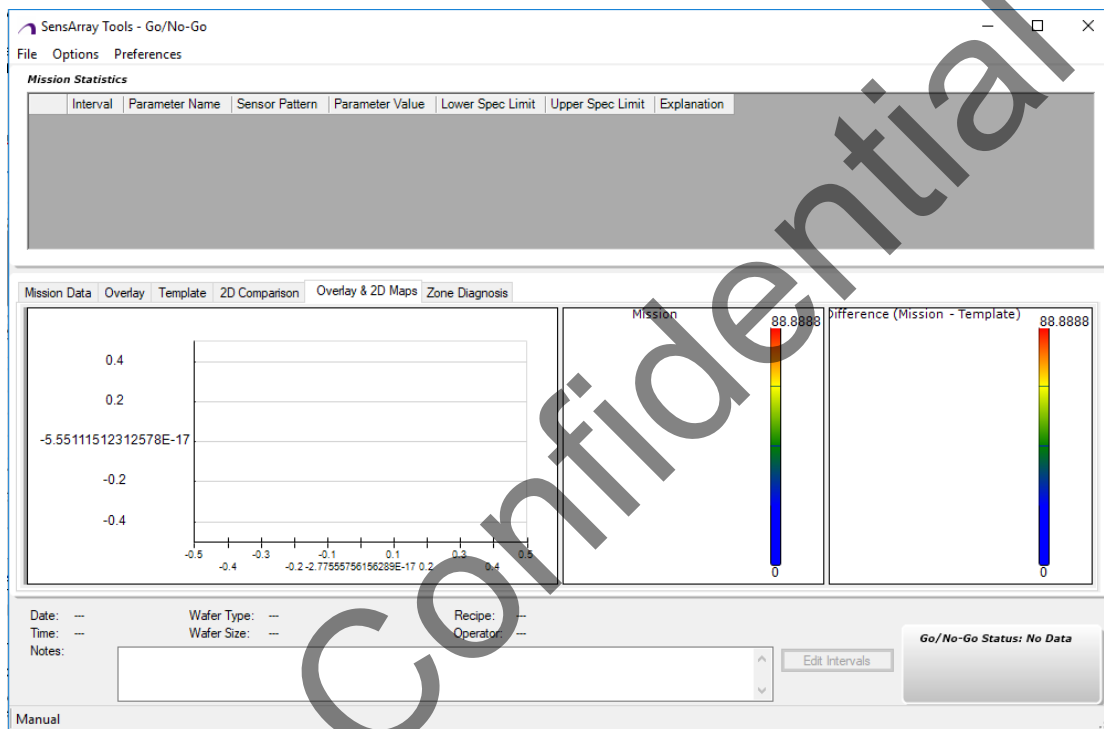
Figure 6-12 Go/No-Go Home page

2. Click **File** from the menu and then select the **Open** option to select a mission to analyze. You can see the **Mission Selector** window opens.

3. Apply filters and select the required mission(s) to limit the number of missions from which to select.

4. Drag the missions that is to be analyzed, into the **Selected Missions** list. And then click **OK** button.

5. The **Go/No-Go** window opens, defaulted to the **Mission Data** tab. The mission is loaded, and the analysis results are presented. If the mission is within spec, the data and the **Go/No-Go Status** area are shaded **green**, as shown in Figure 6-13.

Figure 6-13 Go/No-Go – Mission Statistics

6. If any parameters are out of spec, the data and/or the **Go/No-Go Status** area are shaded red, to alert that the mission did not pass.

   Notes:

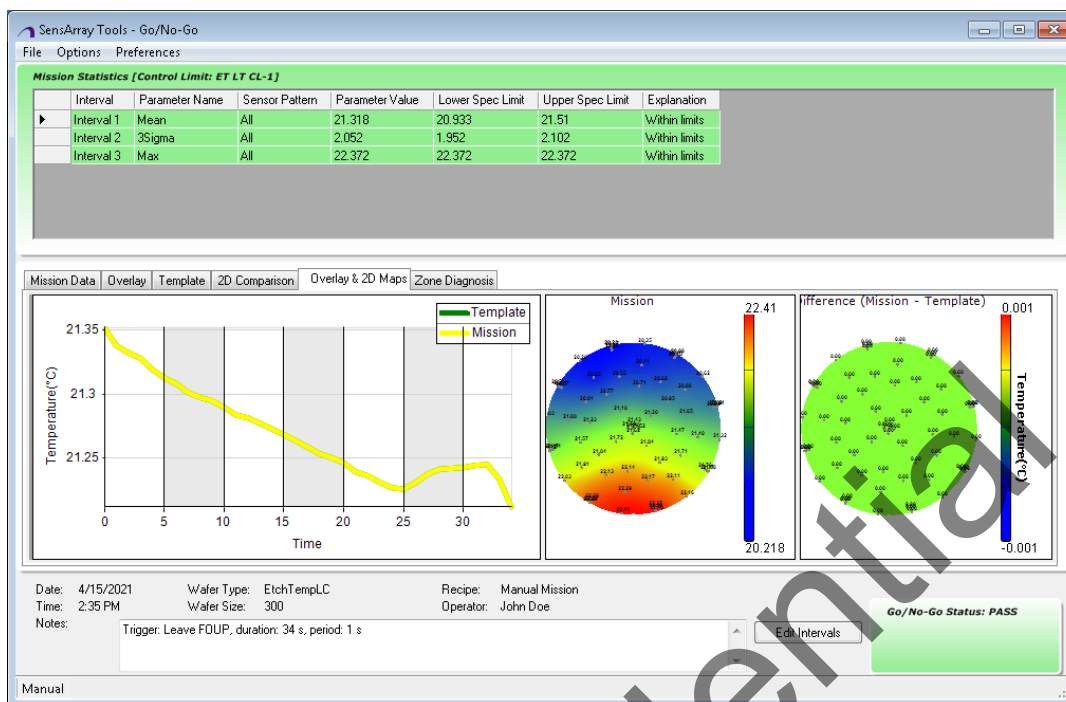   ▪ The **Overlay** tab presents a graph of the selected mission mean, compared to the template mission mean.

   ▪ The **Template** tab presents, for reference, the original mission used for the template.

   ▪ The **2D Comparison** tab provides surface plots of the selected and template missions. The **Difference** graph presents the differences between the selected mission and template.

7. To select a different interval, click a different row of the data table at the top. Selecting a different interval updates the 2D surface plots.

6.5   SPC Charting

The **SPC** (Statistical Process Control) **Charting** allows you to view **Control Charts, Scatter Plots, Distributions and Raw Data** for multiple missions. This provides the ability for you to review trend information for a specific chamber, to ensure the chamber remains within spec over time. **SPC Charting** requires a template for the recipe to be analyzed. If an appropriate template is not available, refer to the Identifying Data to be Analyzed Using a Template - Step 1 - Create a Template section.

Note: The **Warning** dialog box, some missions could not be matched to template and were removed from analysis, opens when running **SPC Charting**, it means:

The mission does not resemble the reference template. Click the **Show Mission** button in the **Warning** dialog box, to verify that the excluded missions do not match the template.

Choose/Create a better template as a reference.

Contact **KLA SensArray** if neither of the above actions resolve the problem.

6.6   Match Analyzer

The **Match Analyzer** module allows you to compare two or more chambers running the same recipe. The data provided from this module allows you to easily identify chambers that have fallen out of spec. **Match Analyzer** requires a template for the recipe to be analyzed. If an appropriate template is not available, refer to the Identifying Data to be Analyzed Using a Template - Step 1 - Create a Template section.

6.7   Profile Comparison

The **Profile Comparison** module simultaneously displays **Time Graph, 2D Graph and Numerical Data** for two or more missions. Profile comparison requires a template for the recipe to be analyzed. If an appropriate template is not available, refer to the Identifying Data to be Analyzed Using a Template - Step 1 - Create a Template section.

6.8   Chamber Matching

This feature allows you to view the mission(s) data and compare them with each other. This will allow you to review a set of missions whether historical or for multiple chambers from a single tool or a group of tools and compare the results.

You can retrieve the details of mission failure and the related statistics.

The Chamber Matching has the below key-features to review and analyze the mission(s) data:

Multi Mission Review:

This tab displays the mean trace of multiple missions and the golden mission template, 2D Mission Map and 2D Difference map in a scrollable list. This tab allows you to view the set of loaded missions and compare the results with each other.
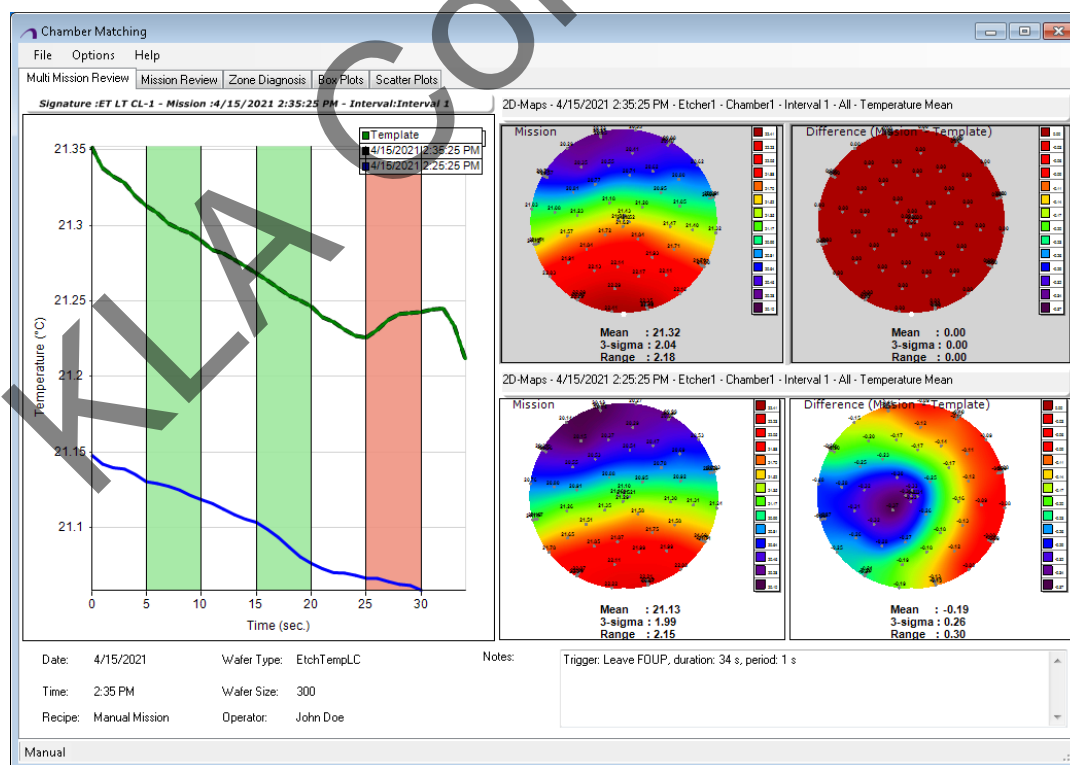

Figure 6-14 Multi Mission Review

Mission Review:

This tab displays a single mission mean and golden template overlay, a scrollable list of missions that show pass/fail condition, and a 2D mission and difference map. This tab allows you to view a selected mission against the golden mission.
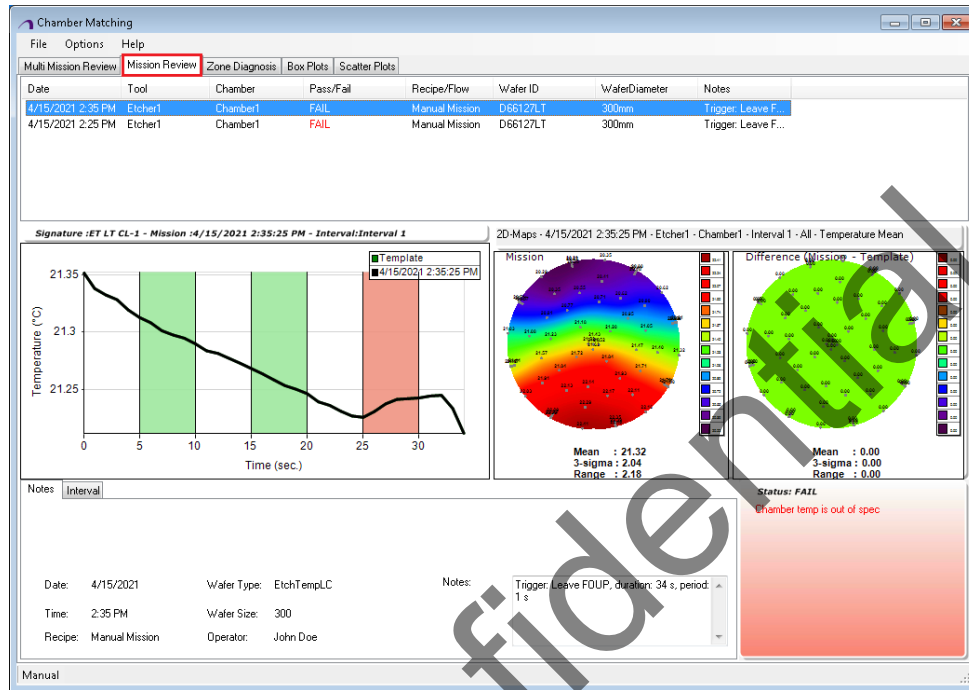

Figure 6-15 Mission Review

Zone Diagnosis:

This tab displays a color-coded zone display of the chuck; red indicating a failure condition in that zone and green indicating a pass condition in that zone. This tab allows you to view more detail for the specified mission based on the zones defined by you.
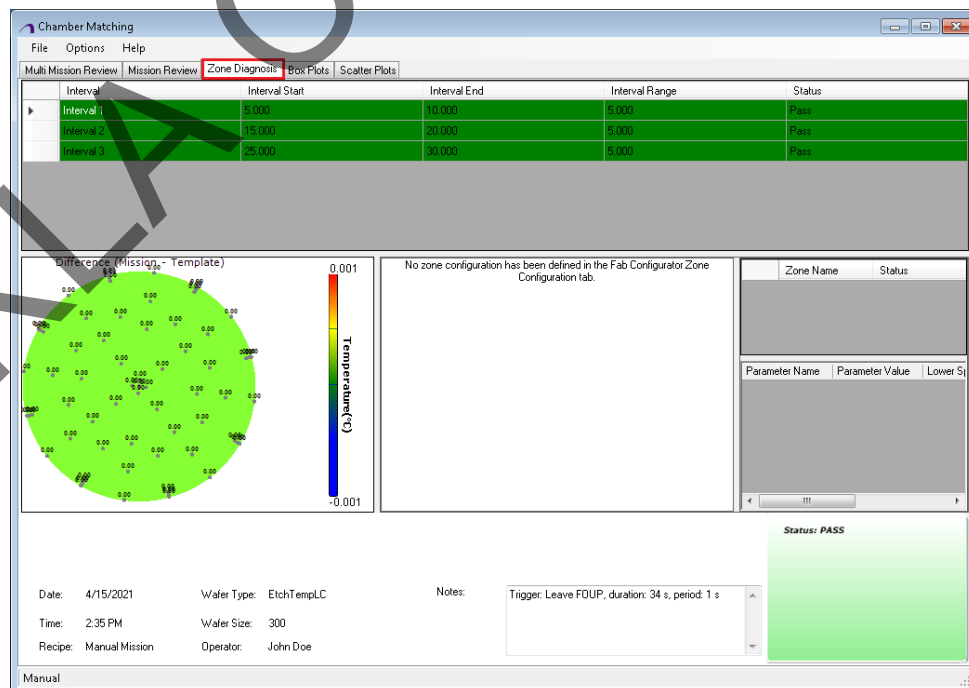

Figure 6-16 Zone Diagnosis

Box Plots:

This tab displays the details in a plotted box of the missions related to different temperatures of the selected interval. You can view the Box Plot for a required interval limit using the drop-down.

Figure 6-17 Box Plots

Scatter Plots:

This tab displays the details of the mission in a graphical representation separately for the intervals Mean, Minimum, Maximum, etc., of the template.
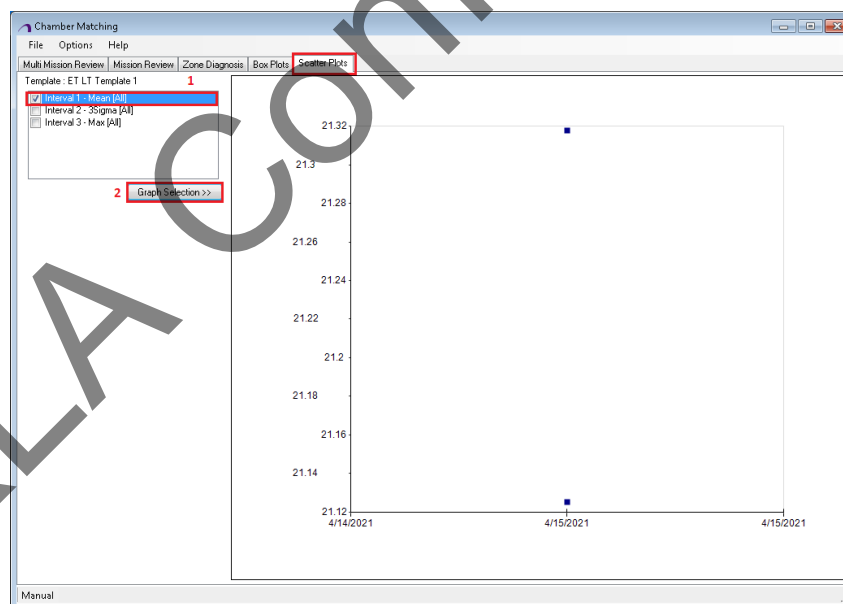
Figure 6-18 Scatter Plots

6.9   Data Interpolator

Data Interpolator allows you to compare different product's mission data and interpolate the same with different set of sensor locations and for the required intervals by specifying the Start Point and End Point.

More accurately it is interpolating to measurement locations used by another data source. This allows direct comparison for data which does not align with our products' sensor locations. You can preview and save the interpolated data file for future reference.
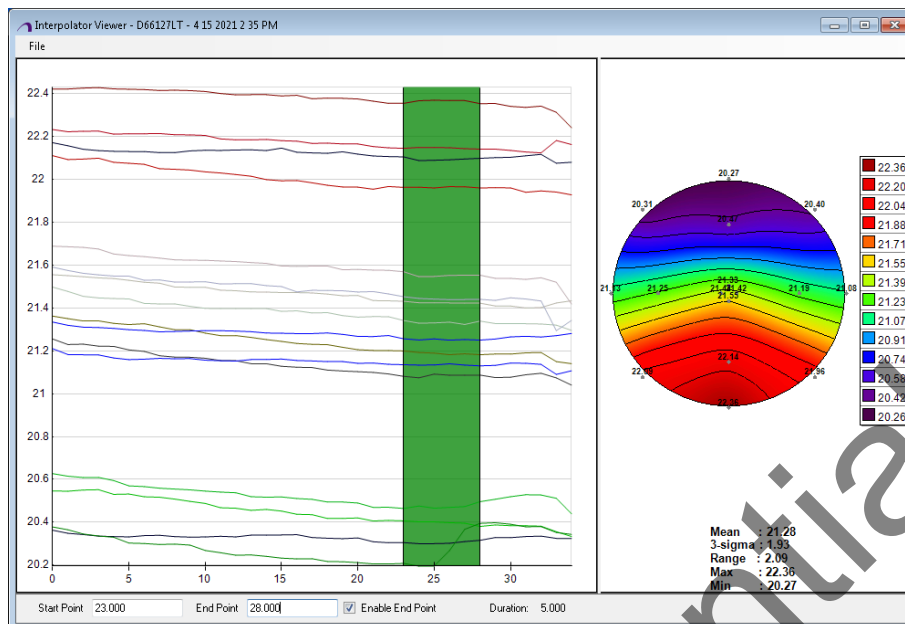
Figure 6-19 View of interpolated data
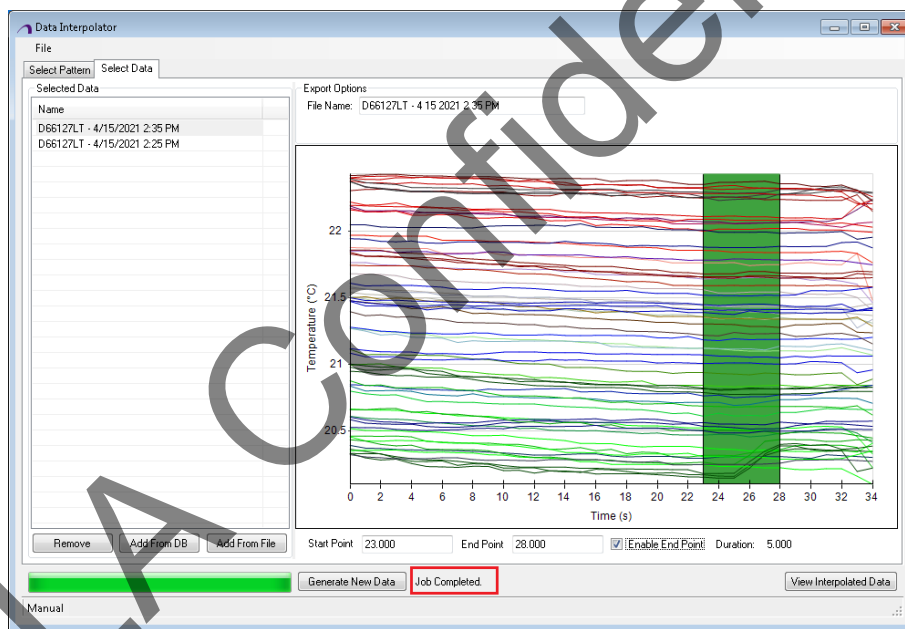
Figure 6-20 Job completed window

7. Modify Existing Tags in the Database

A data tag is a set of metadata for a mission. This metadata includes the name of the person who collected the data, the chamber and recipe upon which the mission was run, the date the mission was run, and notes. The information for the metadata tags are the inputs during Fab Configuration. The **Data Importing and Tagging** module is used to import legacy data formats and modify existing data tags. Legacy data is saved to the **SensArray Tools** database and a data tag is created for each file imported.

Legacy formats currently include OnWafer data files (WFR), SensArray Excel files (XLS, TXT), and AE Pilot wafer data (CSV).
Note: Use files with the proper file extension (such as, CSV, TXT, WFR, XLS), in a location accessible by **SensArray Tools**.

The process of importing data is comprised of the following steps:

- Step 1 - Import Data
- Step 2 - Select Missions (to import missions that were previously tagged and saved)
- Step 3 - Check the Tagged Data

Step 1 - Import Data

1. Click **Data Importing and Tagging** module on the **SAT** launcher UI. The **Data Import - Select Desired Action** window opens, as shown in Figure 7-1.
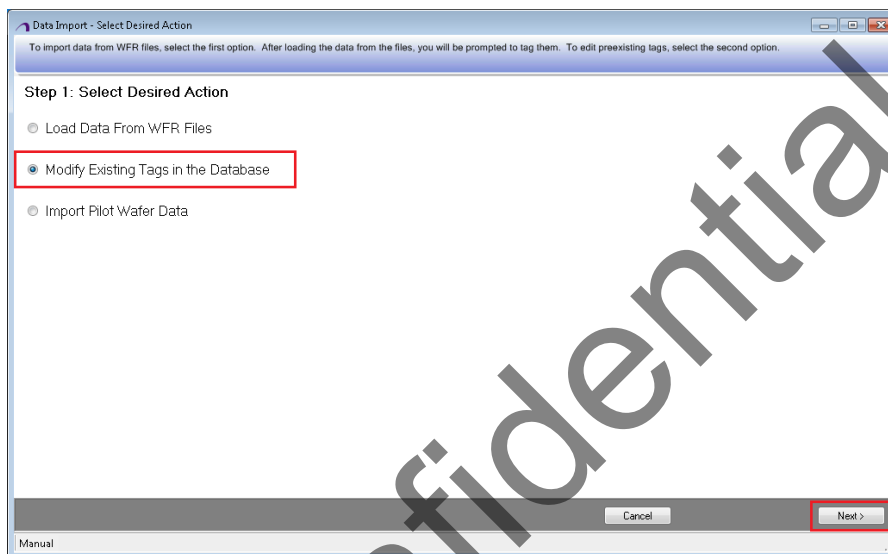
Figure 7-1 Data Import – To Select Desired Action

2. Select the **Modify Existing Tags in the Data Base** and click the **Next >** button.
3. You can see the **Mission Selection** window opens.
   Note: If an option was not selected, a **Warning** dialog box opens with a message to select one of the options.

Step 2 - Select Missions

1. Apply filters in the **Mission Filters** panel and select the mission(s).
2. Click **Next >** button.
3. You can see the Mission Recipe List opens, as shown in Figure 7-2.

Figure 7-2 Data import – Mission Recipe List

4. Select recipe from the **Mission Recipe List**, then click **Accept** button.
5. You can see the **Data Import - Summary** window opens and contains the list of all data tags that were Re-tagged, as shown in Figure 7-3.

Figure 7-3 Data import – Summary

Step 3 - Check the Tagged Data

The Summary page table lists all data tags that were added or updated.

1. Click the **< Back** button and correct it if any information is incorrect.
2. Click the **Finish** button if the data is correct. The **SAT** UI opens.
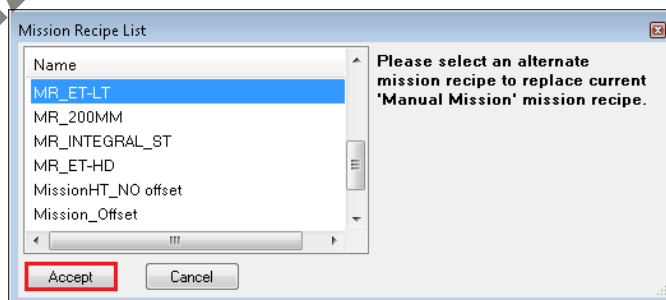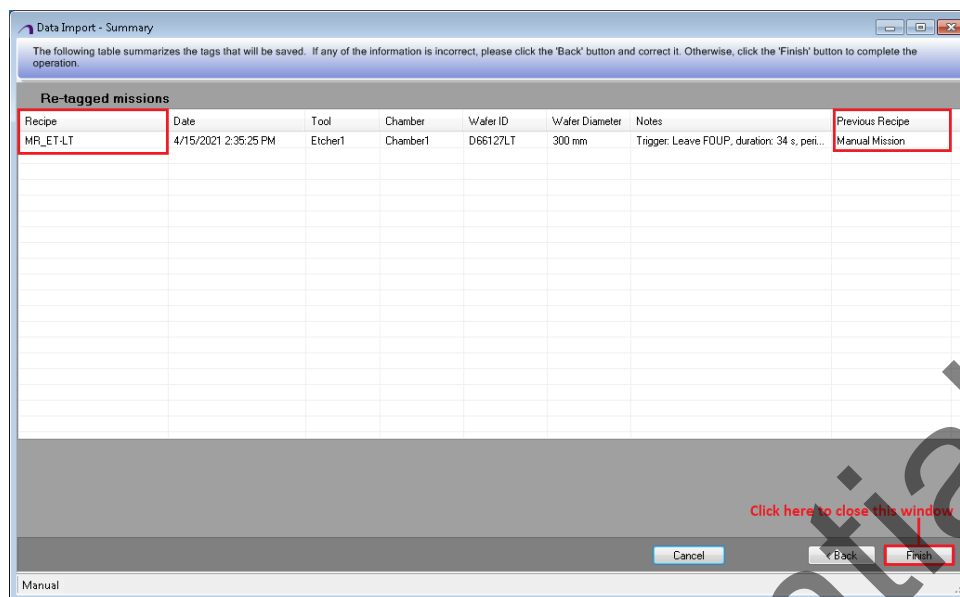
Note: If there is a problem with the re-tagged data, a **Warning** dialog box opens, listing the problem parameters, and the **Launch Go/No-Go** window points that the out-of-spec information. Correct the information before proceeding.

Appendix -I

To Contact SensArray supportTroubleshooting

To report bugs or submit requests for additional functionality, send an email to customer.support-sensarray@kla-tencor.com.

Include the following information within the email message:

- Description of the problem or request (be specific).
- Exact wording of the error message(s) received and process steps that led to the error.
- If the error dialog box includes a **Details** button, include a text file of the text that appears when the **Details** button is clicked.
  TIP: Copy the Details text to the Windows Clipboard, then save to a Microsoft WordPad file.
- Supporting files (*for example,* screen captures, mission data, and so forth)
  TIPS:
  - *Screen Captures. Press <ALT>+<Print Screen> to copy the Error dialog box to the Windows Clipboard, then paste into Microsoft Paint and save as a GIF or JPG file, or into the same Microsoft WordPad file that includes the message details.*
  - *Mission Data. To save mission data, use the File → Save As File… from the Data Viewer window to export an ODF file.*
- Your name, company, location, telephone number, and email address Support staff will respond to the request as soon as possible.

Glossary

Acquisition Time. Total mission time in seconds; the amount of time it takes a process (plasma recipe) to run.

Boxplot. Method for showing different types of data populations; the spacing between the various parts of the box help indicate variance, skew, and identify out-of-specification values.

Critical Dimensions (CDs). Width of a patterned line or the distance between two lines, monitored to maintain device performance consistency; also, the dimension of a specified geometry that must be within design tolerances.

Control limit. Allows numbers to be associated with a template, to indicate the expected values for the calculated statistics. *For example*, if a template for a recipe calculated the mean of a steady-state period, the control limit for that template would specify the minimum and maximum values expected for that mean.

Data Tag. Set of metadata for a mission, which includes the name of the person who collected the data, the chamber and recipe upon which the mission was run, the date the mission was run, and notes.

Data Viewer. Allows viewing of data from the current mission run or from previously saved data, and to start the Mission Controller and Smart Device Control Center to run new missions.

Dataset. *Collection of missions* for the program to generate a suggested set of limits.

Dongle. Infrared device used to communicate with a wafer contained in a wafer carrier.

Etch. Process for removing material in a specified area through a wet or dry chemical reaction or by physical removal, *such as* by sputter etch.

Fab Configurator. Part of the *SensArray Tools* software that allows you to represent the fab so that *PlasmaSuite* can monitor the fab.

Fabrication. Integrated circuit manufacturing processes.

Fabrication Yield. Percent of wafers arriving at wafer sort compared with the number started into the process.

Flow. Computer program, rules, specifications, operations, and procedures, which are organized in steps and are performed each time to produce/process a wafer.

FOUP. Front-Opening Unified Pod. Docking station used for storing, protecting, loading, and unloading wafers, as well as communicating with and recharging Integrated Wafers.

Go/No-Go. Determines whether a mission is within specification.

Histogram. Graphical display of tabulated frequencies; a graphical version of a table that shows what proportion of cases fall into each of several or many specified categories. The histogram differs from a bar chart in that it is the *area* of the bar that denotes the value, not the height.

Import. Process of loading data sets (files) into the *SensArray Tools* database. Available by selecting **Data Importing and Tagging** from the **Configuration** menu on the **PlasmaSuite** window.

Interval. Defines the portion of the recipe to be compared and analyzed.

Match Analyzer. Compare relevant statistics between multiple chambers.

Mean Temperature. Arithmetic mean/average of two or more channels over a specific time slice.

Median Temperature. Middle value of two or more channels over a specific time slice.

Mission. One set of data collected by a sensor wafer. The mission specifications are set by using the Mission Controller or Smart Device Control Center.

Manual Mission Controller. Software that allows you to set up and run missions to gather fab data for analysis.

Mission Filters. Apply filters to narrow the number of missions selected for comparison. Missions can be filtered by *Recipe*, *Fab*, *DataSet*, *Wafer ID*, *Date*, *Included Missions*, *Data Type*, *Notes*, and *Diameter*.

Parameters. Defines the statistics to be calculated for the selected template interval, and the pattern of sensors to use in the calculations.

Plasma. High-energy gas made up of ionized particles.

Plasma Etch. Dry-etch process using reactive gases energized by a plasma field.

Plasma Fab Hierarchical Levels. These consist of customer, location, fab, bay, tool, and chamber.

Plasma Recipes. Processes used to run *PlasmaSuite* sensor wafer products.

PlasmaSuite. *SensArray Tools* software for analyzing plasma etch fab performance.

Profile Comparison. View 2D profiles of multiple missions.

Recipe. Computer program, rules, specifications, operations, and procedures, which are organized in steps and are performed each time to produce/process a wafer. Used in *PlasmaSuite*. Each chamber in the fab must have a recipe associated with it.

Recipe Step. Single action within a recipe.

Sample Rate. Speed of acquisition during data collection. *For example*, a sample rate of 2 means that data will be collected from all sensors on the wafer every 2 seconds.

Scatter Plot. Chart that uses Cartesian coordinates to display values for two variables. Data is displayed as a collection of points, each having one coordinate on the horizontal axis and one on the vertical axis.

Sensor. Device that responds to an environmental variable (*such as* temperature).

Sensor Pattern. Select the sensors to be used in calculating template parameters during a mission run. Available options are *All*, *None*, *Outer Ring*, *Inner Disc*, *Mask Edge*, and *[new pattern]*. By default, all sensors on the wafer are used.

Smart Device Control Center. Software that allows you to set up and run missions to gather fab data for analysis. Used with 3rd generation **SmartFOUP360ez** and **SmartBOXez** devices.

SPC (Statistical Process Control) Chart. Tool used to determine whether a manufacturing or business process is in a state of statistical control or not. If the chart indicates that the process being monitored is not in control, the pattern it reveals can help determine the source of variation to be eliminated to bring the process back into control. A control chart is a specific kind of run chart.

Steady State. Stable condition that does not change over time, or in which change in one direction is continually balanced by change in another.

Tag, Tagging. Set of metadata for a mission. This metadata includes the person who collected the data, the chamber and recipe on which the mission was run, the date the mission was run, and notes.

Template. Defines the regions of interest within a mission run using a specific process. It also defines the important statistics for each region (*such as* mean, range, and standard deviation). Identifies critical intervals for a production, monitoring, or diagnostic process.

USB (Universal Serial Bus). Replaces various kinds of serial and parallel port connectors with one standardized plug and port combination. Connect USB-compliant devices (*for example*, the provided portable computer), by way of a USB cable connected to the devices' USB port(s), then power-on the devices.

Wafer. Thin round slice of a semiconductor material from which chips are made.

Wafer Carrier. Used to protect wafers during the wafer fabrication.

Wafer Fabrication. Series of manufacturing operations that places the circuit or device in and on the wafer.