Getting Started with the OI

Introduction

Use the OI to run tests, monitor test status, and save the test results to a local directory or a server.

Deploying the OI to Production

Deploy the OI to run in a production environment, including installing the required packages, configuring a handler/prober driver, connecting the OI to a server, etc.

Installing the OI

Pre-requisite

- Install the STS 20.0 bundle.

Procedure

1. Placeholder.

Configuring a Handler/Prober Driver

Pre-requisite

- Open TestStand.

Procedure

1. Select **Semiconductor Module»Configure Station**.
2. Select **Enable Handlder/Prober Driver (Real or Simulated)** on the **General** tab.
3. Select an appropriate handler/prober driver for your handler or prober from the pull-down menu.

   For more information about which driver to select, ask NI engineers for help.

   Tip:
   If you do not have access to a real handler, select **Built-in Simulated Handler Driver** to simulate handler functions.

4. Select **Configure Handler/Prober**.
5. Specify the settings for the selected handler/prober driver.

   Tip:
   Click the **Help** button at the botton left for more information about each option.

6. Click **OK** to accept the driver settings.
7. Click **OK** to close the **Configure Station Settings** dialog box.

Enabling STDF Log for Processing Test Results

Pre-requisite

- Open TestStand.

Procedure

Note If this configuration is not done, the OI throws the following error after you click the **Save Intermediate Data** button: **Datalog does not exist. Call mechanical engineer and platform test engineer.**.

1. Select **Semiconductor Module»Configure Station**.
2. Click the **Advanced** tab.
3. Select **Result Processing**.
4. Add the **STDF Log** option to the **Output Name** column if it is not listed.
    a. Click the right arrow on the top right.
    b. Select **STDF Log** from the list.
5. Place a checkmark in the **Enabled** column next to **STDF Log**.
6. Click **OK** to enable STDF log.
7. Click **OK** to close the **Configure Station Settings** dialog box.

Connecting the OI to a Server

Note:
The OI must be connected to a test program server and a test data server so that it can download test program from and upload test data to the correct locations. Follow this procedure to connect the OI to a real server if available. If you do not have a real server or do not want to connect to a real server, connect the OI to a simulated server by following the procedure in Connecting the OI to a Simulated Server *(on page 5)*.

Procedure

1. Open `[Configuration Dir]/db/env_config.txt`.
2. Update the `[server_data_IP_1]` variable values to match the test data server that you are connecting to. For example, change the *server_data_IP_1* value to the IP address of your server and confirm the customer ID value is correct.
3. Complete the following steps to connect to a second test data server for another customer:

a. Update the *server_data_FTP_count* value to 2.

Note:
If the *server_data_FTP_count* value is 1, the OI saves the test data to the first test data server even if you have configured a second test data server.

b. Update the `[server_data_IP_2]` variable values to match the second test data server that you are connecting to. For example, change the *server_data_IP_2* value to the IP address of your second server and confirm the customer ID value is correct.

4. Update the `[server_pmg_IP]` variable values to match the test program server that you are connecting to. For example, change the *server_pmg_IP* value to the IP address of your server and confirm the customer ID value is correct.

Connecting the OI to a Simulated Server

Note:
The OI must be connected to a test program server and a test data server so that it can download test program from and upload test data to the correct locations. If you do not have a server available or do not want to connect to a real server, follow the procedure to connect the OI to a simulated server that acts as both the test program server and test data server. To connect to a real server, refer to the procedure in Connecting the OI to a Server *(on page 4)*.

Procedure

1. Navigate to the `General OI\DummyTestProgram` folder.
2. Double-click the `Mapping FTP Folder to C Drive.cmd` script to map the FTP folder to `C:\`.
3. Double-click `xlight-x64.exe` in the `General OI\DummyTestProgram` folder.
4. Click the green **Start All Servers** button on the bottom left to enable the simulated server.

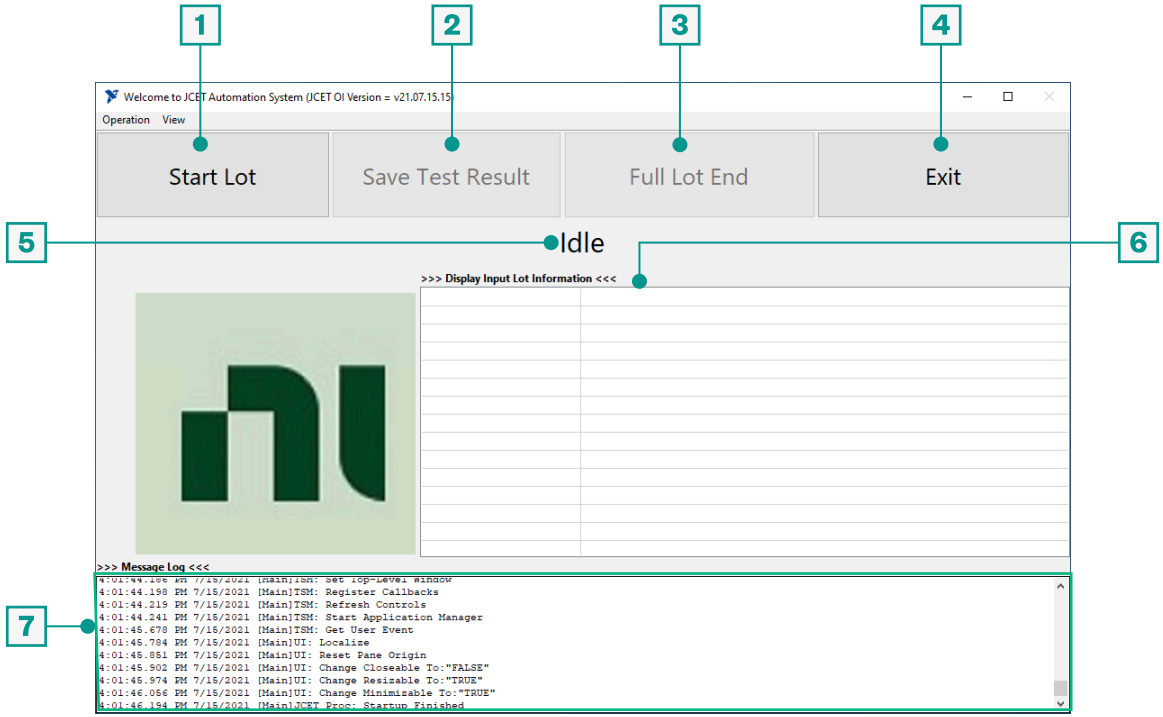
Note:
Repeat step 3 and 4 each time you restart the machine.

5. Verify that C drive include an **FTP** folder. This folder simulates the funtionality of both a test program server and a test data server.

OI Environment

The OI has two user interfaces: the main panel and the default operator interface.

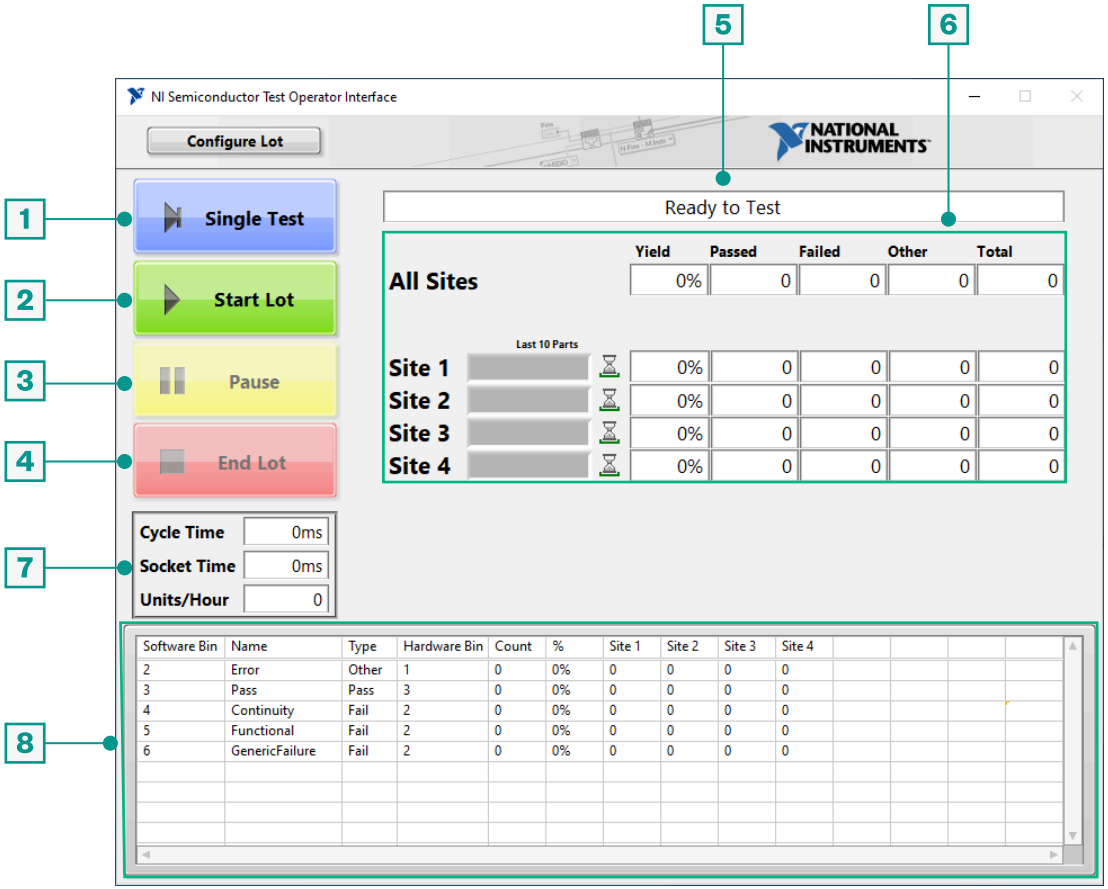
Figure 1. Main Panel



1 **Initialize Lot**	Initializes the lot by downloading the test program and entering or scanning lot information.
2 **Save Intermediate Data**	Saves the intermediate test data and uploads it to a remote server to the following directories. To modify the locations, contact NI engineers. • `C:\testdata\DLOG\CustomerID\DevName\Customer_LotNo\SubLotNo\csvdir` • `[server_data]\CustomerID\DevName\Customer_LotNo\SubLotNo\csvdir` **Note:** You can configure the OI to delete the local copy of intermediate test data after uploading it to server by changing the value of the *JCET_csvDir_Cut_flag* variable to 1 in the corresponding recipe file at `[server_pgm_dir]/NI_STS/Product/[Customer_ID]/Recipe/[Zipfile_Name]/[Mode_Code]_recipe.cfg`.

3 **Save Summary Report**	Generates and saves summary and transfer reports from the intermediate test data, and uploads the reports to a remote server to the following directories. To modify the locations, contact NI engineers. • `C:\testdata\DLOG\CustomerID\DevName\Customer_LotNo\SubLotNo\FullLotFile` • `[server_data]\CustomerID\DevName\Customer_LotNo\SubLotNo\FullLotFile` **Note:** You can configure the OI to delete the local copy of summary report after uploading it to server by changing the value of the *JCET_FullLotFileDir_Cut_flag* variable to 1 in the corresponding recipe file at `[server_pgm_dir]/NI_STS/Product/[Customer_ID]/Recipe/[Zipfile_Name]/[Mode_Code]_recipe.cfg`.
4 **Exit**	Exits the OI completely.
5 **Status Message**	Displays the OI status in real time.
6 **Lot Information**	Displays basic information of the current lot. The information is either manually entered by the operator or scanned from a barcode.
7 **OI Log**	Displays the OI log in real time, which is helpful for troubleshooting.

Figure 2. Default Operator Interface

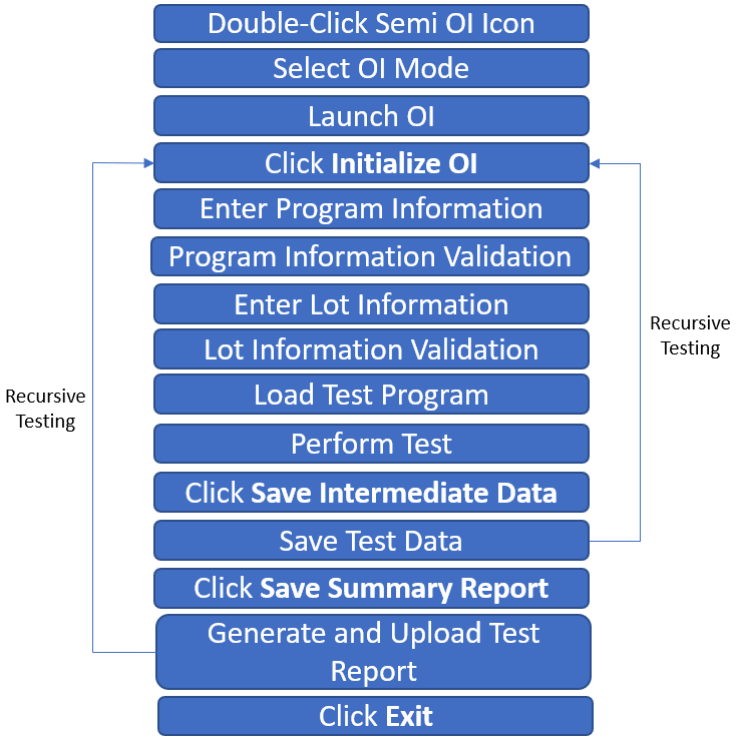


1 **Single Test**	Runs the test program once.
2 **Start Lot**	Runs lot testing, which runs the test program continuously to test all DUTs in the lot.
3 **Pause/Resume**	Pauses or resumes test running.
4 **End Lot**	Stops running the lot.
5 **Test Status Message**	Displays the status of the STS in real time.
6 **Site Execution Data**	Displays statistical and status information for each site in real time.
7 **Statistics Indicator**	Displays statistical information for a lot execution, which you can use to monitor test system performance:

	• **Cycle Time**—Socket time plus index time, which is the time to perform other tasks, such as binning, placing DUTs, and generating reports. • **Socket Time**—Time it takes to perform the test code or the time the DUT spends in the test socket. Socket time is measure by the time elapsed between receiving the start-of-test (SOT) notification from the handler or prober and sending the end-of-test (EOT) notification to the handler or prober. • **Units/Hour**—Number of DUTs tested per hour.
8 **Bin Table**	Displays information about the binning of DUTs for the current lot, such as the names of the software bins, the associated hardware bins, and the DUT counts for each site.

Running the Test Program

The following flowchart shows the high-level workflow of running a test program using the OI.



Pre-requisite

- Ensure the STS is powered on.
- Install the right load board for the DUT.
- Ensure the handler/prober is powered on.
- Double-click the Semi OI shortcut on the desktop to launch the OI.

Procedure

1. Select **MES** or **Operator** mode when prompted, depending on whether you want to run the OI for debugging or mass production purpose.

Mode	Use Case	Verification Password Required?	Alarm Password Required?	Lot and Program Definition Source
Operator	Mass production	Yes	Yes	`BarCodeDefinition.txt`
MES	Debugging and engineering	No	Yes	`.mes` file

2. Click **Initialize Lot** on the main panel.
3. When prompted to enter program information, scan from a barcode to automatically pull the information or enter it manually.
    - **(Operator Mode)** Enter the **Customer ID**, **Program Name** and **Mode Code** as defined in `BarCodeDefinition.txt`, located at `[`*`server_pgm_dir`*`]/NI_STS/Product/[`*`Customer_ID`*`]`.
    - **(MES Mode)** Enter the **Sub LotNo** and **Mode Code** as defined in the `.mes` file, located at `[`*`server_pgm_dir`*`]/MesFile/[`*`Sub_LotNo`*`]/[`*`Sub_LotNo`*`]_[`*`Mode_Code`*`].mes`.
4. Click **Download** to download the test program from the server.

    The OI downloads the test program from the following default directory: `[`*`server_pgm_dir`*`]/NI_STS/Product/[`*`Customer_ID`*`]/[`*`Zipfile_Name`*`]`, where *Zipfile_Name* is the *Zipfile_Name* value defined in `BarCodeDefinition.txt` or `.mes` file.
5. Wait for the download to complete.
6. In the lot information dialog box that appears, scan from a barcode to automatically pull lot information or manually enter the blank fields.
    - **(Operator Mode)** Enter **Operator_ID**, **Device_Name**, etc, as defined in `BarCodeDefinition.txt`.

      The **Tester_ID** field is automatically populated with the computer name, accessible by right-clicking **My Computer** and selecting **Properties**. The other auto-populated fields are pulled from `BarCodeDefinition.txt`.
    - **(MES Mode)** Enter **Operator_ID**, **Test_Code**, and **Test_BinNo**.

      The auto-populated fields are pulled from `Mesfile.mes`.
7. Click **OK**.
8. Confirm the lot information and click **OK**.
9. Click **Lot Test** on the popup window.
10. When the **Wait for SOT** dialog box appears, click **Single Test** or **Start Lot** on the default operator interface to run a single test or continuous tests.

    Note:
    If the test program runs only once after you click **Start Lot**, select **Semiconductor Module»Configure Station** in TestStand to verify the handler settings.

11. Monitor the test status in the following ways:

- View the real-time lot test progress in the **Test Status Message** section of the default operator interface.
- Monitor the real-time status of lot testing by selecting **View»Monitor Window** on the main panel.

Note:
NI recommends that you use this window for debugging only. For mass production, set the *Real_Time_Monitor_flag* variable in `env_config.txt` to 0 to disable this window.

- View mid-lot summary by selecting **View»Mid-Lot Summary** on the main panel.

Tip:
Pause, resume, or end the lot testing using the buttons on the default OI. In case that the default operator interface hides or disappears, select **View»STM-OI Window** on the main panel to bring it to the front.

12. When the lot test completes, proceed with the following steps on the main panel:

- To view test reports, select **View»Report** on the main panel.
- To save intermediate test data and upload it to the server, click **Save Intermediate Data**.

Note:
By default, the OI keeps the local copy of intermediate test data after uploading it to the server. You can configure the OI to delete the local copy after the upload by changing the value of the *JCET_csvDir_Cut_flag* variable to 1 in the corresponding recipe file at `[server_pgm_dir]/NI_STS/Product/[Customer_ID]/Recipe/[Zipfile_Name]/[Mode_Code]_recipe.cfg`.

Note:
Select **View»Configuration Window** in the main panel to see where you can find the test data files locally.

- To generate summary and transfer reports from the intermediate test data , click **Save Summary Report** after the intermediate test data is saved.

Note:

- By default, the OI keeps the local copy of summary report after uploading it to the server. You can configure the OI to delete the local copy after the upload by changing the value of the *JCET_FullLotFileDir_Cut_flag* variable to 1 in the corresponding recipe file at `[server_pgm_dir]/NI_STS/Product/[Customer_ID]/Recipe/[Zipfile_Name]/[Mode_Code]_recipe.cfg`.
- You must first click **Save Intermediate Data** to save the raw data before you can click **Save Summary Report**.

Post-requisite

- To start the next lot, click **Initialize Lot** on the main panel and repeat the previous steps of lot testing.

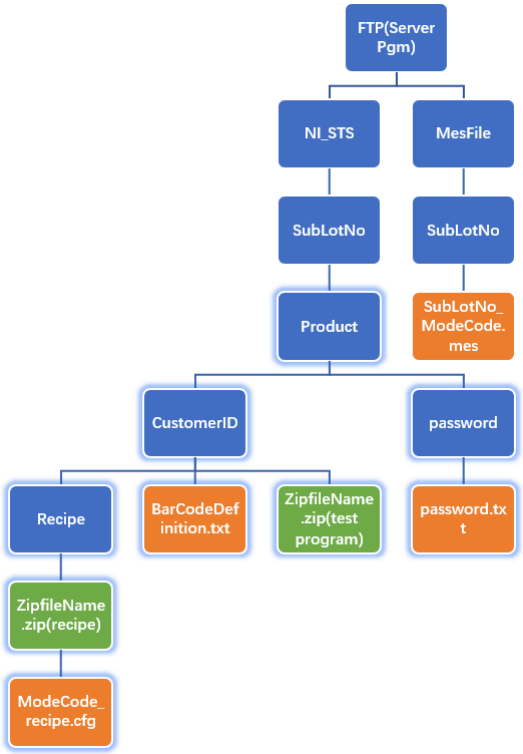
  Note:
  You must save the test result before starting the next lot. If you do not click **Save Intermediate Data** on the main panel after the lot completes, the **Initialize Lot** button on the main panel is dimmed.

- To exit the OI completely, click **Exit**.

Test Program Server Structure

Each time you initialize the OI, the OI downloads test program and configuration files from the test program server, with the following predefined folder structure. You can customize some of the paths and folder names in the `env_config.txt` file. To modify the location of the packaged zip files, contact NI engineers.

Figure 3. Test Program Server Structure



- **Blue**—Folder
- **Orange**—File
- **Green**—Packaged zip file

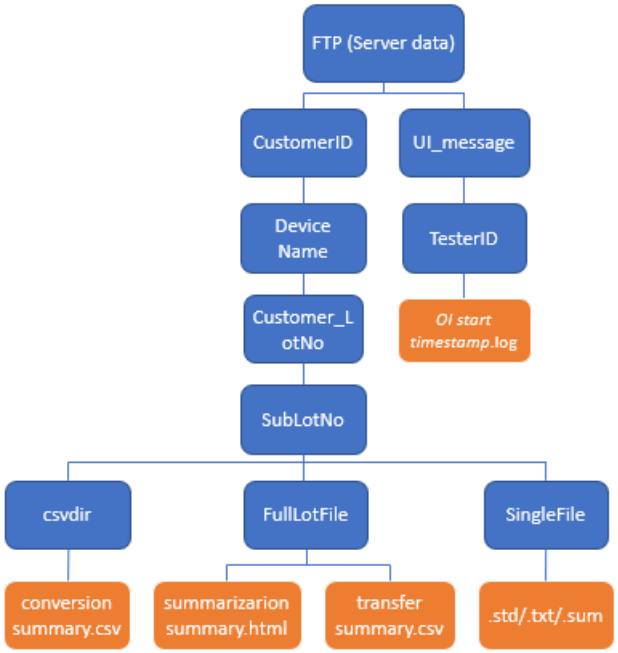
Folder/File	File Type(s) Included	Description
`[Sub_LotNo]_[Mode_Code].mes`	Mes file	Defines the lot and program information in MES mode.
`Mode_Code_recipe.cfg`	Recipe file	Defines the following information:

Folder/File	File Type(s) Included	Description
		• Test data paths, naming patterns, and compression type • Lot information fields that the user enters or the OI pulls from other configuration files • Test code conversion configuration • STDF attribute configuration • Bin configuration • Configuration options of whether to keep the local copy of test program when starting or exiting lot • Configuration options of whether to keep the local copy of intermediate data or summary report after uploading it to server
`BarCodeDefinition.txt`	Barcode file	Defines the following information in operator mode: • Program information • Tester OS version • Mode code
`Zipfile_Name``.zip`	Zipped test program	Zipped test program for the OI to download. *Zipfile_Name* is the *Zipfile_Name* value defined in `BarCodeDefinition.txt` or `.mes` file, depending on whether you are running the OI in operator or MES mode.
`password.txt`	Password file	Defines the verification password(s) in operator mode and the alarm password.

Test Data Server Structure

By default, the OI saves test data and OI log locally in `C:\testdata\DLOG` and uploads them to the test data server with the following predefined folder structure. You can customize some of the paths and folder names in the `env_config.txt` file.

Figure 4. Test Data Server Structure



- **Blue**—Folder
- **Orange**—File

Folder/File	File Type(s) Included	Description
`UIlog`	`.log`	Records detailed operation steps, alarm information, and results. The data is saved in real time.
`csvdir`	Conversion summary of test data (`.csv`)	Converted from the tester summary in `.csv` format, which is generated by clicking **Save Intermediate Data**. It is used as the source for generating the summarization summary (`.html`).
	`[Mode_Code]_[Tester_ID]_config.txt`	Records lot information, start and end time, version information, and conversion summary (`.csv`) path. It is generated by clicking **Save Intermediate Data**.

Folder/File	File Type(s) Included	Description
`FullLotFile`	Summarization summary of test data (`.html`)	Generated by clicking **Save Summary Report** which combines multiple conversion summary (`.csv`) files into one report according to certain calculation logic and the config information. Use this report to view test results in the production line.
	Transfer summary (`.csv`)	Generated by clicking **Save Summary Report** which combines multiple conversion summary (`.csv`) files into one report according to certain calculation logic and the config information. This report is overwritten each time you click **Save Summary Report**. Use this report to transfer in the production line.
`SingleFile`	`.std`, `.txt`, `.sum`	Stores the compressed tester datalog, including tester summary and STDF files generated by the tester.

Configuration Files

The OI uses the following configuration files to define the behavior. You can also customize the behavior by changing some of the configurations.

Configuration File	Description	Default Directory	Can Be Modified?
`env_config.txt`	Defines the following information: • IP address of the program server and data server • Server or local test program path • Server or local test data path • Mes file path • Function call definitions • Alarm flag definitions • Other custom definitions	`[OI program dir]/db/env_config.txt`	Yes.
`BarCodeDefinition.txt`	Defines the following information in operator mode: • Program information • Tester OS version • Mode code **Note:** If a test program is shared by multiple mode codes, sepatate the mode codes using underscores. For example, FT1_QA1 means FT and QA share a program. To define multiple test programs, put each program in an independent row.	`[server_pgm_dir]/NI_STS/Product/[Customer_ID]/BarCodeDefinition.txt`	Yes.
`.mes`	Defines the lot and program information in MES mode.	`[server_pgm_dir]/MesFile/[Sub_LotNo]/[Sub_LotNo]_[Mode_Code].mes`, where *Sub_LotNo* and *Mode_Code* represent the corresponding values in the `.mes` file.	Yes. Can be modified in MES mode.
`[Mode_Code]_recipe.cfg`	Defines the following information: • Test data paths, naming patterns, and compression type • Lot information fields that the user enters or the OI pulls from other configuration files • Test code conversion configuration • STDF attribute configuration	`[server_pgm_dir]/NI_STS/Product/[Customer_ID]/Recipe/[Zipfile_Name]/[Mode_Code]_recipe.cfg`, where *Customer_ID*, *Zipfile_Name*, and *Mode_Code* represent the corresponding values in the	Yes.

Configuration File	Description	Default Directory	Can Be Modified?
	• Bin configuration • Configuration options of whether to keep the local copy of test program when starting or exiting lot • Configuration options of whether to keep the local copy of intermediate data or summary report after uploading it to server	`BarCodeDefinition.txt` or `.mes` file, depending on whether you run the OI in operator or MES mode. **Note:** Each mode code has a corresponding recipe file.	
`password.txt`	Defines the verification password(s) in operator mode and the alarm password.	`[server_pgm_dir]/NI_STS/Product/password/password.txt`	Yes.
`CfgRelationship.db`	Defines the following settings: • System settings, such as version of TestStand and TSM that the OI calls, local directory where the OI stores the test test program after downloading it from server, and the local directory where the OI stores the test data before uploading it to server. • Tester settings, such as station waiting time and site number • Barscanner settings • Compression settings, such as compression tyle • Program and lot information fields to enter in the first dialog box that pops up after the user clicks **Initialize Lot**.	`[OI program dir]/db/CfgRelationship.db`	No. Contact NI engineers for any changes.

Troubleshooting

The following are the common errors or issues that you may run into when using the OI, and the corresponding solutions.

Test Data Found in Local Folder But Not on Server

Procedure

1. Check the UI log message or the UI message file in `C:\testdata\DLOG`.
2. Refresh the server folder after the file uploads.

Compression Unsuccessful with Selected Compression Type

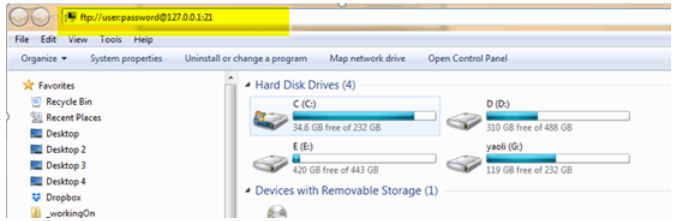
Procedure

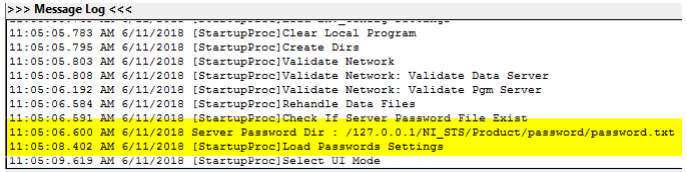
1. Check the notes of the configuration file to determine whether the test program supports this compression type.
2. If the compression type is supported, copy the 7-Zip folder in the 7-Zip installation directory to C drive.

Chinese Characters in OI

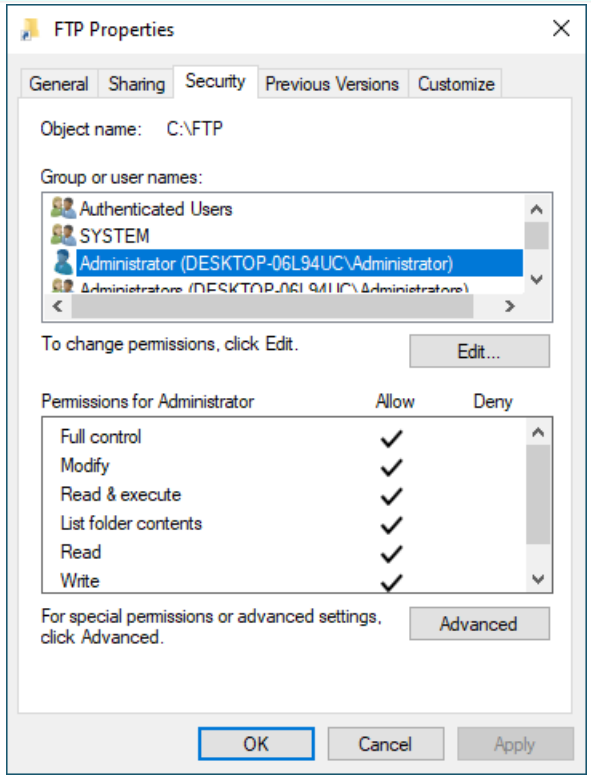
If the OI shows Chinese labels for controls and indicators, check the language settings in TestStand by selecting **Configure»Station Options»Localization**.

Common Error/Alarms

Error/Alarm Code and Description	Possible Reason	Solution
U01—Cannot connect to server. Call mechanical engineer.	The server is not configured correctly.	Verify that the configuration for the test program and test data servers is correct in `[OI exe dir]/db/env_config.txt`. You can verify whether the configuration is correct by entering the IP address with the following format in the address bar in Windows Explorer: `ftp://username:password@ip:port`. For example, `ftp://user:password@127.0.0.1:21`. 
U02—Datalog does not exist. Call mechanical engineer and platform test engineer.	STDF log is not enabled for processing test results.	Follow the instructions in Enabling STDF Log for Processing Test Results *(on page 4)* to enable STDF log.
U03—Cannot connect to server. Call mechanical engineer.		

Error/Alarm Code and Description	Possible Reason	Solution
U05—Summary does not exist. Call manufacturing leader.		
U06—Cannot connect to server. Call mechanical engineer.		
7zipNotInstalled—7zip is not installed. Install 7zip application and config path option in environment.		
O01—Password failed.		
U04—Config does not exist. Call manufacturing leader.		
M01—Mesfile does not exist in server. Call IT. **M02**—Program does not exist in server. Call IT. **O02**—Barcodefile does not exist in server. Call IT. **O05**—Program does not exist in server. Call platform test engineer.	• Program or configuration file is placed in the wrong location in the program server • FTP permission issues.	• Verify that the program or configuration file is placed in the correct location in the program server. The OI log displays the server location where the program attempts to read the test program or configuration file. The following image shows an example path of `password.txt` that the OI attempts to read from.  • If the path is found on the server but the test program or configuration file does not exist, check FTP permissions.
M03—Mesfile modecode check failed. Call IT.		
M04—Mesfile program definition error. Call platform test engineer.		
M05—Current program does not match last program. Call platform test engineer.		
M06—Recipe file does not exist. Call platform test engineer.		
M9—Tester_ID check failed. Call manufacturing leader.		
M10—Lot information check failed. Reinput values.		
M11—Testcode input failed. Reinput values.		
M12—Device_name does not match. Call mechanical engineer setup.		
M13—Tester software version check failed. Call plaform test engineer.		
M14—SubLotNo check failed. Called IT.		

Error/Alarm Code and Description	Possible Reason	Solution
M15—Test program file does not exist. Call platform test engineer.		
O03—Program name does not exist in barcodefile. Call platform test engineer.		
O04—More than one program name exists in barcodefile. Call platform test engineer.		
O06—Barcodefile modecode check failed. Call manufacturing leader.		
O07—Barcodefile program-defined error. Call platform test engineer.		
O08—Current program does not match last program.		
O09—Recipe file does not exist. Call platform test engineer.		
O10—Tester ID check failed. Call manufacturing leader.		
O11—Lot information check failed. Reinput values.		
O12—Testcode input failed. Reinput values.		
O13—Device name does not match. Call mechanical engineer setup.		
O14—Tester software version check failed. Call platform test engineer.		
O15—Input2&input3 program name failed. Reinput values.		
O16—Test program file does not exist. Call platform test engineer.		
550—	Permission issues of file or folder in FTP server or local machine.	Check permission of file or folder in FTP server or local machine.

Error/Alarm Code and Description	Possible Reason	Solution
		
-15425—Failed to establish FTP connection.	• The server is not configured correctly. • Firewall or anti-virus software may cause FTP connection failure.	• Verify that the configuration for the test program and test data servers is correct in `[OI exe dir]/db/env_config.txt`. You can verify whether the configuration is correct by entering the IP address with the following format in the address bar in Windows Explorer: `ftp://username:password@ip:port`. For example, `ftp://user:password@127.0.0.1:21`. • Try turning off firewall or anti-virus software.
-17500 Operation Failed. Location: Step 'UUT Report' of Sequence 'Module Plugin – UUT Done' in 'xxxx.seq'. Test Socket 0.	This error is from NI's Model Plug-in. The features customized by some manufacturers, such as customized reports, are implemented in the Model Plug-in.	Contact NI engineers.
-1074118575 Location: Step 'XXX' of sequence 'MainSequence(or ProcessSetup or ProcessCleanup)' in 'YYY.seq'. Test Socket 0.	Test program error.	Contact NI engineers.

Error/Alarm Code and Description	Possible Reason	Solution
User-defined error code. Site: 0. niDCPower/niDigital/RFmx/niRFSG...		
-1073807304 Location: Step 'Wait for SOT' of sequence **StartOfTest** in "`Seiko Epson_160831.seq`" User-defined error code. Site: N/A.	This error comes from `Seiko Epson_XXX.seq`, an NI handler driver program.	Contact NI engineers.

If the error is not listed above or if the listed solution does not work, refer to `OperatorInterfaceErrors.log` in the OI program directory for detailed error messages that occurred when the OI ran, including errors that occurred in OI, handler driver, and test program. To seek for NI assistance, include the `OperatorInterfaceErrors.log` file and OI log to help NI engineers locate errors.