# EXECUTION ENGINE MENUS

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In the previous presentations, we talked about the structure of the NewTS architecture – Execution Engine and Soft Panels. If you didn’t watch the Execution Engine presentation I would highly advise you to do so. The link 1 to that video can be found in the description below.

The Execution Engine application has many functions, and introducing all of them in a single video seems to be not too reasonable. Please keep in mind that the Execution Engine application was developed and new functions were added based on the real use of it in the real projects.

Before I will begin talking about Execution Engine features, I need to make a statement, which is very important to me. I am many years old and started working with LabVIEW in 1996. Since then I completed many great projects and built my own set of tools. One such project that I consider as my masterpiece was the Neutron Flux Mapping for the Westinghouse Electric company.

However, there will be times when I will not be able to work due to my age and I would like to share my developments with the hope that it may help your professional growth. So, I placed most of my tools and developments in the GitHub repository and you can access it by Link 2, which you can find in the video description. There is, also a link to the Execution Engine application – link 3. It is fully functional and you can use it for free for 60 days. But, keep in mind, to explore the all features of the Execution engine you have to have at least one instrument’s soft panel. There are many soft panels in the GitHub. For all of them, no license is needed, and I hope you will find something suitable for you.

If my work will be helpful to you and you can donate, I will be very grateful. The link for donation is also in the video description.

Now let’s talk about the Execution Engine.

First, we have to log in at the engineering level and let the application finish initialization. After that, we should go to the Test Editor page, where the majority of controls for developing test cases are located. Please note, that if to the right of the control displayed the blue letter M, it means that this control has a custom menu.

## Part 1. Part Number selector.

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Place the cursor over it and press the right mouse button. The user menu list will be displayed. The very first menu item is the Add a new part number. This function is intended to generate a new test. Let us make this selection. The “Add New Part Number” window will open and we have to enter the required information. Let’s enter “ The Execution Engine Menu Demo” as the part number and “ This video intended to demonstrate the Execution Engine menus”, as the UUT description.

As soon you will enter this data, the Done button will become enabled. Press this button.

The part number text ring now will have the new item, which we just created. There are no test cases configured yet, so, the test case selector, the test configuration table, and the test case configuration table are empty.

At the same time the corresponding sub-folder “ The Execution Engine Menu Demo” will be created in the UUT folder which is located in the same folder as the Execution Engine application. At this moment there is the single file Test Cases dot cfg. This file will contain all data related to the test case.

In the Part number menu, there is the “Open Test File” menu item. But, before doing that we have to go to the System Settings page and specify the Notepad path by navigating to it. ((⏱️=2000))

Now we can use that menu item. As a result, the file will be open.

While using the Execution Engine in real projects I faced situations when an already created set of test cases had to be modified by adding or removing individual test cases. The test cases are saved in the Test Cases dot cfg file and new sections are added to the end of the file. To take care of this issue, in the user menu was added Sort Test File item. To demonstrate that function let’s open the previously created test file, and copy and paste upfront all existing sections of one of the test cases. Let’s rename this section to 2.1, save and close the file. Now select the Sort Test File item and after that select the “Open Test File” item. As can be seen, section 2.1 is placed after section 2, which is the proper position.

The next item we will be talking about is the “Remove Part Number”. Applying this function deletes the whole part number subfolder from the UUT folder.

Next, Edit UUT description allows you to change the UUT description.

Another menu item for this control is the “Refresh Test Configuration”. Since we made changes to the configuration file it would be reasonable to reflect these changes in the Test Configuration table. As you see, the new test case 2.1 is added to the table.

It concludes the review of the user’s menu of the Part Number control.

## Part 2. Test Case user menu.

Now let’s review the Test Case selector user’s menu.

The first menu item “Add New Test Case” is used to add a new test to the UUT Test Configuration.

Upon selection of the Add New Test Case item, the prompt window will be open where we have to fill up all fields marked by red astricts character.

Based on my personal use of the Execution Engine, I may suggest that the test case parameter, description, and test conditions should be imported from the test protocol. It will make navigation through test configuration easier and, the time needed for verification will be shorter.

The next test case selector menu item is “Duplicate Test Case”. In many cases, the acceptance test protocol contains similar tests, but with different test conditions. Because of that, it would be reasonable just to duplicate a similar test and then modify its instruction arguments.

To demonstrate this function, first, let’s delete or remove the just-created test 2.1. To do that we can select test case 2.1 and select the Remove Test case item of the test case selector user’s menu. Next, let’s assume that we want to duplicate test case 1.2.

To do this let’s select that test case and, next, select the Duplicate Test case item. The Duplicate test case window will be open and it will contain the same information as the source test case. Now we have to make changes, and, first of all, to change the test case number. The software will not allow duplicating the test case with identical numbers, however parameter and description can be the same.

Similar results will be achieved if we, first select the item Copy Test Case and then Paste Test Case, but from my personal experience of a large number of test cases, one or another way may be convenient.

Let’s select test case 1.2 and the menu item “Copy” following the menu item “Paste”. The PASTE TEST CASE WINDOW WILL OPEN. We have to make the new Test case 1.4 number and, if needed, modify test case attributes – Parameter, Description, and Test Conditions. After that press the done button – the new test case is being created.

The next menu item is the Remove Test case. Select the newly created test case and the menu item Remove test case. It will result in deleting all instances of this test case.

The next menu item, we didn’t talk about is the Edit Test Cases Attributes. The process of configuring tests can be long and tedious. There may be a need to edit parameters and descriptions of individual test cases. To do this we can use the “Edit Test Case Attributes” menu item. In this case, the Edit Test Case Attributes window will be open and we can make the desired changes.

The last item in the test case selector menu is the Open Test Case file. Since the test cases are stored in the TestCases.cfg file which is a text file we can open it with the notepad. This function is the same as for the Part number selector.

Please note, that the Execution Engine application does not have the SAVE button. All settings are saved automatically every 250 seconds. The same is implemented in all soft panels.

This concludes the test case user’s menu description.

## Part 3. Test Configuration table user menu.

The Test Configuration table menu was developed as a result of the extensive development of the real test.

The first item is the Clear table will clear the contents of the Test Configuration table. To re-populate this table we can go to the part number selector and select the Refresh Test Configuration menu item.

The test Configuration multi-column text box allows us to select multiple rows and to deselect it we would use the “Clear Selection” item.

Next, the Clear ALL Symbols menu item.

A single click on any populated row constitutes selection and transfers the content of that test case to the Test Configuration table, the double click on such row inserts the X-symbol to that row which results in skipping that row from the test execution. The number of such exclusions is equal to the number of populated rows in the table. In some projects, the test configuration table may contain hundreds of test cases and, during the test tuning and verification, it will be practical to exclude some tests from execution by placing the X-mark to the corresponding table rows. But there will be moments when you need to clear all these symbols to execute the test completely. It can be done by selecting the Clear all Symbols menu item.

However, if you need to enable only the selected row you can use the Clear Selected Symbol item of the user menu.

We can execute the whole test by pressing the “RUN ALL” button. The test is executed the same way as by pressing the button Start, except the test report will be skipped. This function is used exclusively for test tuning and debugging.

As you see the test execution progress is indicated by setting up the background color of each row corresponding to the specific test case. The green color indicates successful test execution, while red indicates the test failure. The Clear background The user menu contains the Clear background item.

The refresh Test Case Configuration menu item performs re-population of the Test Configuration table with test cases content.

During developing huge test projects there may arise a need to test blocks of the test cases. As an example let’s assume that we need to execute test cases 1.1, 1.2, 1.3, and 1.4. To do that we should select test case 1.1 and then, select the menu item “Selection Start”. Next, we have to select the last test case 1.4, and designate it as the Selection End by the corresponding menu item. Then we have to select the menu item Execute selection, followed by Extract Selection item. As you see, the set of instructions is being transferred to the Tet Case Configuration table which is the source of instructions during the test execution. Now we can execute the extracted block of instructions by pressing the Execute all button.

There may be a need to do some test case editing. The correct way to do it is to select the desired test case row in the Test configuration table and perform editing in the Test Case Configuration table. As the example let’s edit the instruction of step 1.2.2. To do that we have to double-click on the 1.2.2 row and transfer its instruction to the editing area: Instruction/Function, Argument 1, Argument 2, Argument 3, and Limits Index, if applicable. After completing the editing process, we should press the Update Instruction button.

As you can see the Save Test Case button becomes enabled. Now we can save the updated test case. The reason I am talking about it is, that if we do it while the block of test cases is selected, the whole content of the Test Case Configuration table will be saved to the test case designated as the Selection Start.

I am talking about it because I made that mistake many times and would like to prevent you from repeating my mistakes.

While there is the option to select a block of test cases, you can select all test cases by using the Select All menu item.

During the development of the part test, a situation when there needs to increment or decrement of some test case numbers. This can be done by using the Decrement selected test case number(s) or Increment selected test case number(s) user menu items. To demonstrate these functions, let’s select test case 1.1 following the Selection Start menu item. Then select the test case 1.4, following the selection End menu item. Next, we have to select the “Execute Selection” menu item. As a result, the test cases 1.1, 1.2, 1.3, and 1.4 will be highlighted or selected. Now, let’s select the Increment selected test case number). As a result, the test cases 1.1, 1.2, 1.3, and 1.4 will be changed to 1.2, 1.3, 1.4, and 1.5. In this case, we can add a new test case 1.1 if it is needed without disturbing the whole part number test flow.

Now, let’s apply the “Execute selection” menu item again and then apply the selected case number(s). These actions will result in transforming test cases 1.3, 1.4, and 1.5 to 1.2, 1.3, and 1.4.

The next menu item is the Exclude Selected From Execution places X-marks on the selected test cases.

The Selection Management group of menu items allows you to save symbols of the test case configuration to the configuration file or load them back. It is convenient when tunning/debugging the test takes a long time, so you don’t need to repeat the test configuration over and over again. To demonstrate this function, let’s apply the “Execute Selection” menu item, following the “Exclude Selected From Test Execution”, which will result in inserting X-symbols in all selected test cases. Now we will go to the “Selection Management” following “Save Selection As Config.1”. Next, let’s apply the “Clear Selection” and “Clear All Symbols” menu items. As we can see, all selections and all symbols were cleared. Now, let’s apply the “Load Selection Config.1” menu item and we will see that both – test case lines and symbols become restored.

Now we will talk about the Selected Cell text Attributes menu item. During test development, it will be convenient to highlight rows corresponding to the Test protocol sections. It will make navigation in the Test Configuration table much more convenient. In our NI-USB6343 Demo MultiSlot example, we can assume that test case 1 is the specific test protocol section. Let’s select this test case and then from the Selected Cell Test Attributes select Selected Cells Font item and next Selected Cells Blue Font items. As you see, the test case 1 text is changed to blue. Now, we will repeat these steps, but select the Selected Cells Bold Font menu item. As you see the font changed to the bold style.

The last menu item is the “Selected Cells Underlined Font” toggle the text underlining on and off.

This concludes the Test Configuration user menu items and their functions.

## Part 4. The Test Case Configuration user menu

The Test Case Configuration multi-column text box contains all instructions related to the corresponding test case. The first user menu item is the “**Clear table**”. The execution of this function removes all items from the table. However, it does not affect the test case record in the file.

To re-populate the Test case Configuration table, just de-select and then re-select the test case.

The “Copy All” menu item allows you to copy the whole content of the table and place it in the designated notifier. Please note that this copy function has nothing to do with the Windows copy function where content is placed in the clipboard.

To demonstrate this function, let’s select the test case 1.4 and then use the Copy All function. Now let’s select test case 1.1, and clear the table. Now in the Test Case Configuration table, we select the menu item Paste. As a result, the whole content of the previous test case is copied to the new location. Please note that step numbers are re-calculated.

The next menu item is the “Copy selected”. To demonstrate this function, let’s select test case 1.3 and highlight steps 1.3.4, 1POINT3POINT5, And 1 POINT 3 POINT 6 - just for demo purposes. After that, select the copy selected item of the test case configuration menu. Now, let’s go to test case 1.1 and select the Test Case Configuration user menu item “clear selection. Now let’s select the last step in the table and the paste After Selected item. As you see the copied instruction will be pasted after the step we just selected.

A similar effect will be if we select the “paste before selected” step number. However, if we select the “Paste” menu item, the whole content of the Test Case Configuration table will be replaced.

However, in some cases, it will be difficult to see the pasted instructions. To overcome this issue the user menu has three more Paste items

Paste without Steps Re-calculation

Paste Before Selected without re-calculation

And Paste After Selected without re-calculation.

Their functional behavior is the same as other paste items, except they don’t perform step numbers re-calculation.

If you are satisfied with the performed instructions paste, you can use the next menu item – re-calculate step numbers.

Let’s clear the Test Case Configuration table for test case 1.4 by selecting the clear table item name.

The next menu item we have to talk about is the “import sequence from file”. Before execution of this menu item function, we have to go to the Instruction/function selector and from its user menu select the instrument of interest. In our case, it will be the NI-USB6343. Now, after we specify which instrument instructions sequence we want to use, we have to go to the Test Case configuration user menu and select the “import Sequence From File” menu item. The “import sequence from file” window will open and, if previously saved, the Sequence File Names selector will be populated by their names. Let’s select the AI\_Test.cfg file and press the Open button. It will result in populating the local Test Case Configuration table with the contents of that file. Now we can copy these instructions to the Test case Configuration table of the Execution Engine using such buttons as:

Insert at top,

Insert at bottom,

Insert Before selection

or Insert after selection.

All these insertions behave in the same way as we discussed above.

The last group of the menu items are:

-Clear selection – clears the Test Case Configuration Table,

-Delete Selected – deletes the selected steps from the table

and Clear background – removes the background colors from all table rows.

This concludes our discussion of the Test Case Configuration menu.

## Part 5. The INSTR/FUNCTION user menu

The INSTR (Instruction)/Function selector first user menu item “Open Selected Instrument” allows to open a selected instrument soft panel.

Let’s select the test case 1.4 and then double-click on the step number 1.4.3. It will result in transferring the instruction components to the

-instrument/function selector

-argument 1

-argument 2, and

-argument3.

In the instrument/function text ring, let’s select the open selected instrument menu item. It will result in the NI-USB6343 soft panel being open.

We can select any instrument from that text box which is populated from the E:\NewTS Framework folder. Please make sure that all soft panels in this folder are fully functional.

Now, let’s select the Disable Instruction menu item. This action will place the “no entry” symbol on all test cases in the Test Configuration table where this instruction is used. Let’s select test case 1.3 to verify that this instruction is marked as well. You can select any other instruction and apply the Disable Instruction menu item again and again.

To clear this Disable Instruction mark we can select the next menu item – Clear Disable Instructions List.

The next menu item is the Find Instruction. Let's select test case 1.1 and in the test case configuration table, we will double-click on step 1.1.3. The elements of the selected will be transferred to the editing controls:

-instrument/function selector

-argument 1

-argument 2, and

-argument3.

In the instructions/function menu let’s select the Find Instruction item. As you see, test cases in the Test Configuration table became marked by check marks because these test cases contain the same instruction. Now let’s select test case 1.2 and clear selection of the Test Case Configuration table. Again let’s use the Find Instruction. Please note that the same instruction is highlighted in step 1.2.3. This is a valid proof of functionality of this menu item. From my experience in developing large tests, this particular function is invaluable during test tuning.

The next menu item is the Update From instrument. What you have to know is that every instrument’s soft panel has the associated System Configuration.cfg file. In this file, there is a section Set, where The Key Functions where all items for Argument 2 of the execution engine are listed. Each item from the Function key becomes the key, where their values are defined. The features of the soft panel configuration file are the subject of the other video about soft panels. The point is that this file can be changed and to update instruction parameters we can use the Update From Instrument user menu item.

If the instrument’s soft panel is developed properly its folder will contain the sub-folder Docs. In this sub-folder should be at least two documents – the Operations Manual which comes from the instrument manufacturer and the Soft Panel Manual made by a soft panel developer.

The instructions/functions menu allows us to access these manuals but before doing it we need to specify the location of the Adobe Acrobat Reader. The file path selector is located on the System Settings, Communications page. As soon as this path is specified we can use the Open Instrument’s Manual or/and the Open Instrument’s Soft Panel Manual.

The last menu item is the Copy Selection to Clipboard which performs copying of the string in the instruction/function text box to the Windows clipboard.

This concludes the review of the instruments/functions selector user menu items and their functions.

## Part 6. The Limits Index user menu

The last control with the user menu on the Test Editor page is the limits Index.

During the test, the test results are evaluated against high and low limits. The limits are stored in the limits file under the limits index as the configuration file section. For a better understanding of this, we can open the limits file by selecting the Open Limits File menu item of the Limits Index control. As you see there we have just two sections [101] and [102] holding limits. However, for large tests, the number of limit indices can be large too. When we have to create a new set of limits, we need to know existing limits indices to not override them. If it happens, a big mess in the test case configuration is guaranteed. To avoid this we should use the menu item the Get Numbers. As a result, the array Limits list will be populated. This indicator is located on the System Settings page and Communication sub-page. This information is very useful for test development.

The next, also very useful function is performed by the Find menu item. Let's select the limits index 101 and apply this menu item all test cases in the Test Configuration table, where these limits are used, will be highlighted and marked by checkmarks. Also, there will be a dialog window stating that the Limit number 101 has 4 instances in the part test sequences. If we go to any of these test cases we will find their presence in the GET instruction.

Now let’s select the limits index 103 and apply the find menu item. Because this limit is not used in test cases the warming message “The limit # 103 has no instances in the part test sequences”.

The “sort limits file” menu item performs sorting of the limit index sections in the Limits. cfg file. When there are too many limits, there is a chance that corresponding sections will be not arranged in ascending order. It makes searching for them more difficult. This function solves the issue.

This section concludes the discussion of the limit index menu.

## Part 7. The Memory controls the user menu

The Execution Engine uses memory to store and display the test results. But, it is not the memory in the common sense – it is the large set of numeric or string controls. There are 384 controls designated to be the Numeric memory and 192 string controls designated as string value memory. While it looks like a lot – it is not. In one project I used 382 numeric memory places.

The reason why all these GUI objects are controls is that you can test the test report generation without executing the whole test. Because of this, there is the user’s menu containing application items as well as user-defined items such as Format String. Use of this menu item results in opening the dialog window where we can modify the control format string.

Also, we can copy the format string from one control and paste it into another control using the menu items “Copy Format String” and “Paste Format string”.

In the case of failure, during test execution, the numeric memory control can be set to blink. This is optional and can be turned on or off on the system settings page and subpage options by the NumMemory – Not Blinking checkbox.

This concludes this video about controls user menus of the Execution engine.