

DEX-Pro Utility Manual

Data acquisition utility

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1. Introduction

1.1. Overview

DEX-Pro is a data acquisition utility delivering an automated extraction and control test solution with reliable performance for unconnected devices.

Developing a test program in C, C# or LabView is time consuming. However, with DEX-Pro easy-to-use graphic user interface and variety of project templates, users can minimize development time.

The software not only extracts machine data, but also helps recognize target machine. Use it as a convenient utility to verify devices quickly, or set up an extraction system for production.

Upon starting the utility, the DEX-Pro interface appears.



Fig.1-1 DEX-Pro interface

2. Getting Started

2.1. DEX-Pro setting flow

There are 2 stages for setting DEX-100, edit stage and Runtime stage.

Edit stage

During edit stage, user could save the target image for setting script and pages, set up OCR, design the OP screen and setup cursor detection, and after finished the all the set-up in the edit stage, you can save the related set up and script file for run time stage.

Runtime stage

During Runtime stage, there will be 2 modes for you to switch.

Full Control Mode:

In the Full Control mode, you can control the machine with the KB and Mouse. However, the script will not run under the Full Control Mode.

Data extraction mode:

In the Data Extraction Mode, you will run the pre-configured script and start to extract the data.

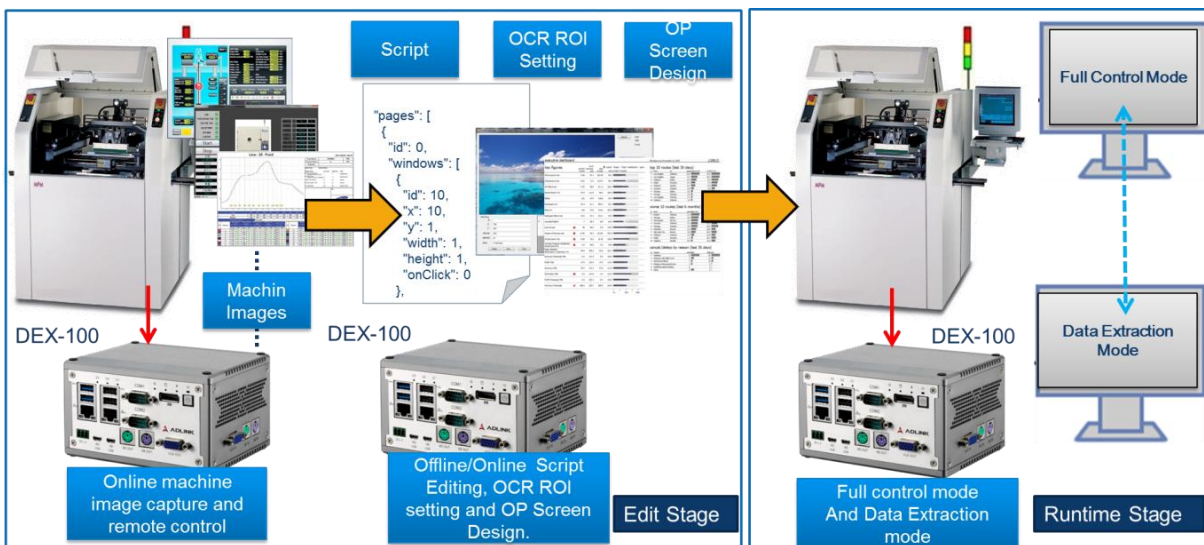


Fig.2-1 DEX-100 working flow

2.2. Connections

2.2.1. Machine's PC Requirement:

The main application for DEX-100 is establishing the connection with brown-field PC-based machine (Machine without open API and protocols) for valuable data extraction. DEX-100 provided a great IOT platform for PC-based machines, through its DEX-Pro, the data from legacy machine could be

extracted by machine image from display signal. Before the data extraction, the basic requirement for the machines are as followed;

- PC based controllers with VGA or DVI output.
- PC based controllers with 2 USB port for Keyboard and mouse input or 2 PS/2 port input for Keyboard or mouse.
- Display with VGA or DVI input.

Note1: There are compatibility issues f when using the KVM with the machine, if you meet the problem, please contact your local ADLINK office.

2.2.2. Connect DEX-100 with the machines

Video interface

DEX-100 provides 2 kind of the video interface to connect with the machines, one is the VGA interface, and the other is the DVI interface. When connecting DEX-100 with the machine, you can choose DVI or VGA interface, and only one interface could be supported during the operation.

Supporting resolution:

Machine Output Display Resolution Support		
VGA	640 x 480, 60fps	1280 x 800, 85 fps
	640 x 480, 75fps	1280 x 1024, 60 fps
	640 x 480, 85fps	1280 x 1024, 75 fps
	800 x 600, 60fps	1280 x 1024, 85 fps
	800 x 600, 75fps	1360 x 768, 60 fps
	800 x 600, 85fps	1366 x 768, 60fps
	1024 x 768, 60fps	1400 x 1050, 60 fps
	1024 x 768, 75fps	1400 x 1050, 75 fps
	1024 x 768, 85fps	1440 x 900, 60 fps
	1152 x 864, 75fps	1600 x 900, 60fps
	1280 x 720, 50 fps	1600 x 1200, 60fps
	1280 x 720, 60 fps	1680 x 1050, 60 fps
	1280 x 768, 60fps	1920 x 1080, 50 fps
	1280 x 768, 75 fps	1920 x 1080, 60 fps
	1280 x 768, 85 fps	720 x 400, 60 fps
	1280 x 800, 60 fps	720 x 400, 70 fps
1280 x 800, 75 fps	720 x 400, 85 fps	
DVI	640 x 480, 60 fps	1440 x 900, 60 fps

	800 x 600, 60 fps	1440 x 900, 75 fps
	1024 x 768, 60 fps	1600 x 1200, 60 fps
	1024 x 768, 75 fps	1680 x 1050, 60 fps
	1152 x 864, 75 fps	1920 x 1080, 24 fps
	1280 x 720, 50 fps	1920 x 1080, 25 fps
	1280 x 720 , 60 fps	1920 x 1080, 30 fps
	1280 x 768, 60 fps	1920 x 1080, 48 fps
	1280 x 800, 60 fps	1920 x 1080, 50 fps
	1280 x 960, 60 fps	1920 x 1080, 60 fps
	1280 x1024, 60 fps	1920 x 1200, 50 fps
	1360 x 768, 60 fps	1920 x 1200, 60 fps
	1366 x 768, 60 fps	

For the non-supporting resolution you can find more information in Sec6.7 for configuring the unknown resolution.

NOTE: Due to the video resolution limitation; DEX-Pro will show different resolution as “1368 x 768’ when the video source resolution is the 1366 x 768.

Keyboard/Mouse Interface

DEX-100 provides 2 kind of the KB/MS interface to connect with the machines, one is the USB interface, and the other interface is PS2 interface. When connecting DEX-100 with the machine, you can choose USB or PS2 interface, and only one interface could be supported during the operation.

Supporting OS

Windows 98 / 2000 / 2003 / XP / Vista / Win 7/, Linux, UNIX, OS2.

Note:

When connecting the machine with PS/2 interface, DEX-100 should turn on before the machine.

Front Panel IO for DEX-Pro application

DEX-100 reserved certain Video interface IO and Keyboard/Mouse Interface for specific applications. In this chapter, the reserved IO will be introduced.

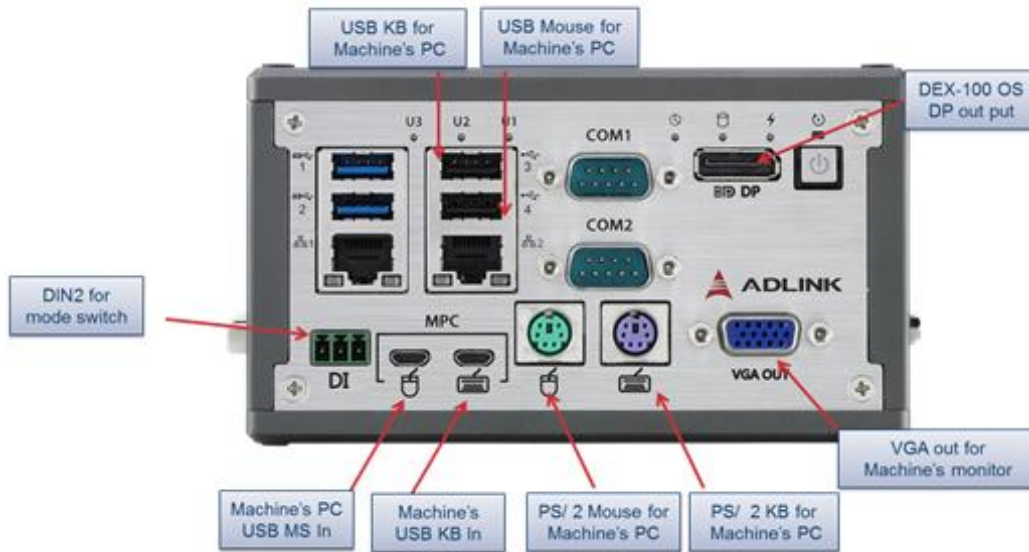


Fig.2-2 DEX-100 front panel IO for DEX-PRO application

I/O connectors and controls reserved for DEX-PRO on front panel are as follows

- VGA Out port
- DisplayPort
- PS/2 keyboard port
- PS/2 mouse port
- USB2.0 port x2
- Micro USB type B x2
- Digital In connectors

VGA out port

DEX-PRO SW uses the VGA out port to display the bypass the image from the machine or the OP screen setup by the user, and the VGA out port should be always connect with the target machine's monitor when controlling and extracting the data from a machine with VGA monitor.

DisplayPort

The Display port shows operating system of DEX-100.

PS/2 keyboard port

DEX-PRO SW uses the front panel PS/2 keyboard port to bypass keyboard signal from a PS2 keyboard to control the machine by the user during the full control mode. This port should connect to a PS/2 keyboard.

PS/2 mouse port

DEX-PRO SW uses the front panel PS/2 mouse port to bypass mouse signal from a PS2 mouse to control the machine by the user during the full control mode. This port should connect to a PS/2 mouse.

USB2.0 port

DEX-100 provide 2 USB 2.0 port, and DEX-PRO SW use the front panel USB 2.0 port to bypass mouse and keyboard signal from a USB mouse and a USB keyboard to control the machine by the user during Full control mode. USB Port 3 is reserved for the USB keyboard and USB Port 4 is reserved for the USB mouse.

Micro USB type B

DEX-100 provide 2 Micro USB type B port, and DEX-PRO SW use the front panel Micro USB port to send mouse and keyboard signal from DEX-100 to control the machine by the user during Full control mode or Data Extraction mode. So these 2 ports should connect to the machine PC's USB port.

Digital input connectors

DIN2 is reserved to switch between the full control mode and data extraction mode.

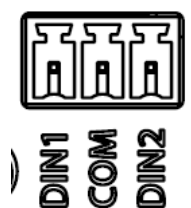


Fig.2-3 Digital input connector

Left Panel IO for DEX-Pro application

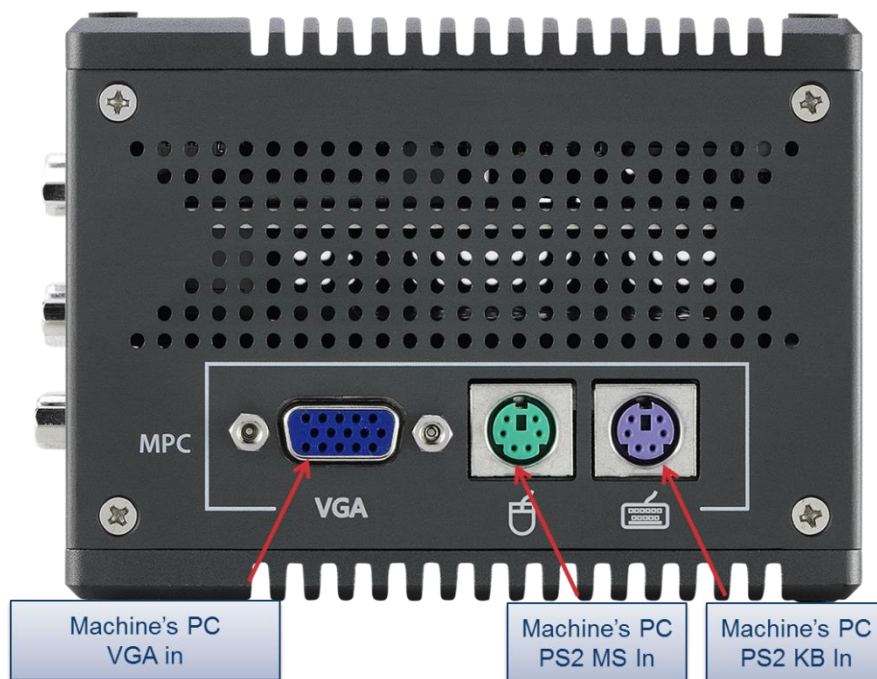


Fig.2-4 DEX-100 right panel IO for DEX-PRO application

I/O connectors and controls reserved for DEX-PRO on right panel are as follows,

- MPC VGA in port
- MPC PS/2 mouse port
- MPC PS/2 keyboard port

MPC VGA in port

DEX-PRO SW uses the MPC VGA port to connect with the machine's PC and process the image from the HMI, and the MPC VGA out port should be always connect with the target machine's PC for controlling and extracting the data from a machine with VGA monitor. This port should connect to the machine PC' VGA port.

MPC PS/2 mouse port

DEX-PRO SW use the front panel MPC PS/2 mouse port to send mouse a signal from DEX-100 to control the machine by the user during Full control mode or Data Extraction mode. This port should connect to the machine PC's PS/2 mouse port.

MPC PS/2 keyboard port

DEX-PRO SW use the front panel MPC PS/2 keyboard port to send mouse a signal from DEX-100 to control the machine by the user during Full control mode or Data Extraction mode. This port should connect to the machine PC's PS/2 keyboard port.

Right Panel IO for DEX-Pro application

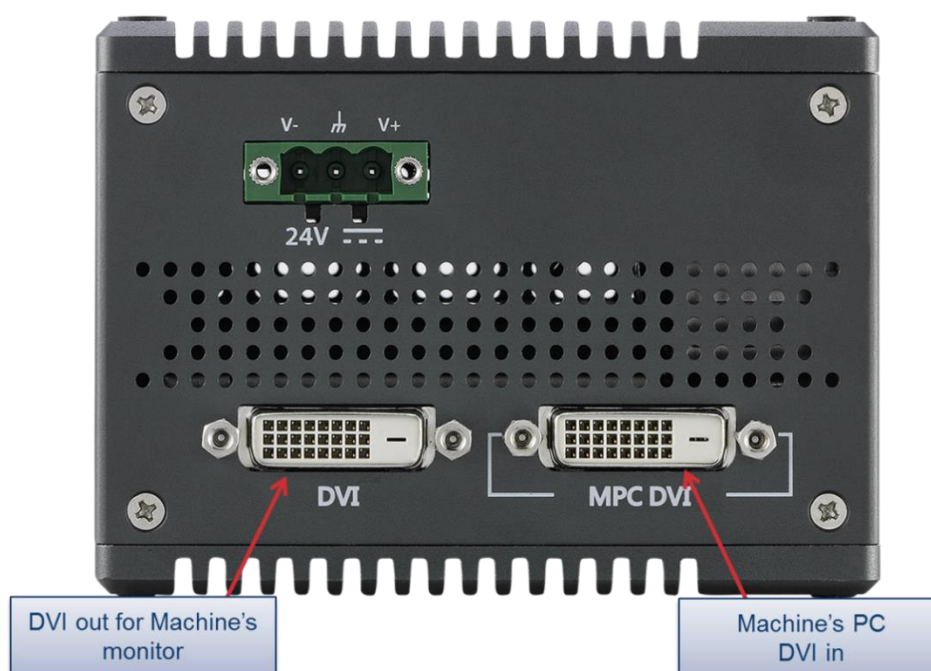


Fig.2-5 DEX-100 left panel IO for DEX-PRO application

I/O connectors and controls reserved for DEX-PRO on left panel are as follows,

- DVI out port
- MPC DVI in port

DVI out port

DEX-PRO SW uses the DVI out port to display the bypass the image from the machine or the OP screen setup by the user, and the DVI out port should be always connect with the target machine's monitor when controlling and extracting the data from a machine with DVI monitor.

MPC DVI in port

DEX-PRO SW uses the MP DVI port to connect with the machine's PC and process the image from the HMI, and the MPC DVI out port should be always connect with the target machine's PC for controlling and extracting the data from a machine with DVI monitor. This port should connect to the machine PC' DVI port.

2.2.3. Edit Stage connection example

Below figure shows a typical connection example for the machine with PS2 KB, mouse and VGA monitor under Edit Stage.

1. Connecting PS/ 2 Keyboard port, PS/ 2 Mouse port and VGA port on the DEX-100 right panel to the machine's PC.
2. Connecting VGA Out port on the front panel to the Machine's PC display.
3. Connecting the DP port on the front panel to a monitor to set-up DEX-Pro software.
4. Connecting the one set USB Keyboard and USB mouse to USB port 1 and USB port 2 on the DEX-100 front panel to operate DEX-100.

Note: You can also connect the PS/ 2 KB and mouse with the PS/ 2 mouse port and PS/ 2 Keyboard port on the front panel to control the machine under full control mode.

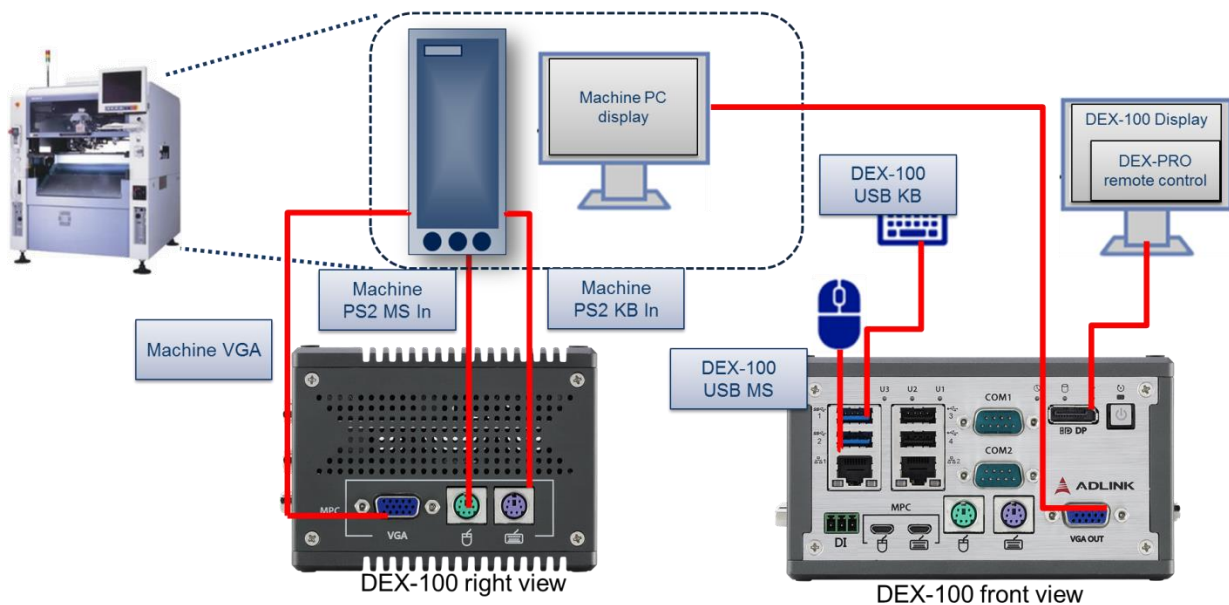


Fig.2-6 Edit stage connection example

2.2.4. Run time Stage connection example

Below figure shows a typical connection example for the machine with PS2 KB, mouse and VGA monitor under Run Time stage.

1. Connecting PS/ 2 Keyboard port, PS/ 2 Mouse port and VGA port on the DEX-100 right panel to the machine's PC.
2. Connect the PS/ 2 KB and mouse with the PS/ 2 mouse port and PS/ 2 Keyboard port on the front panel to control the machine under full control mode.

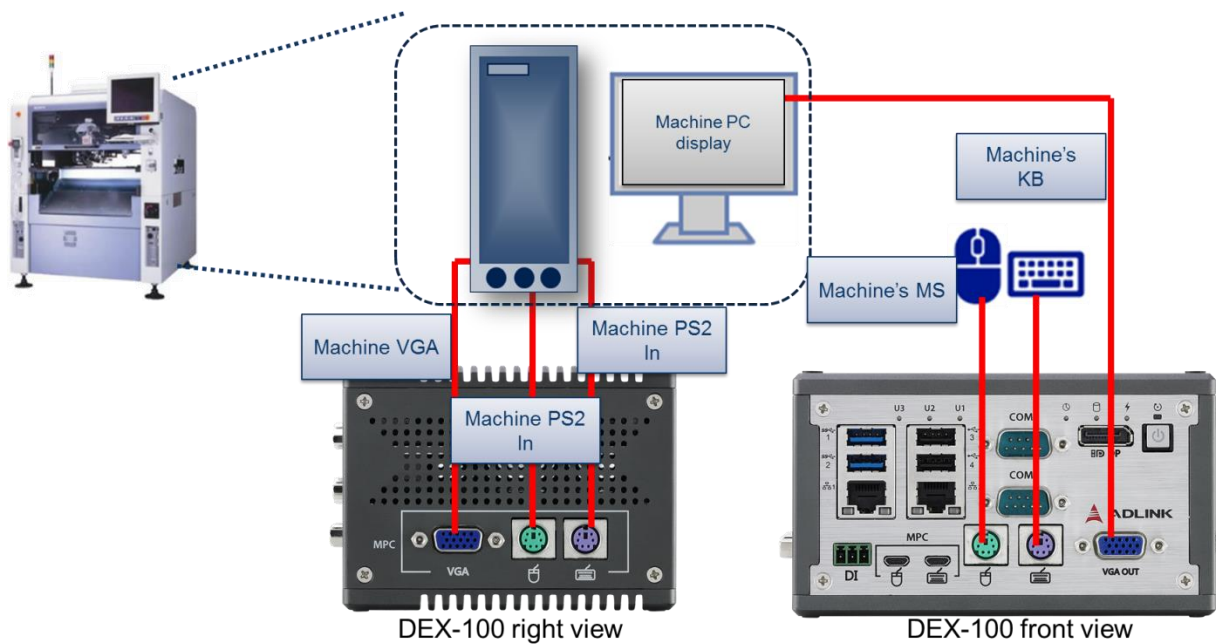
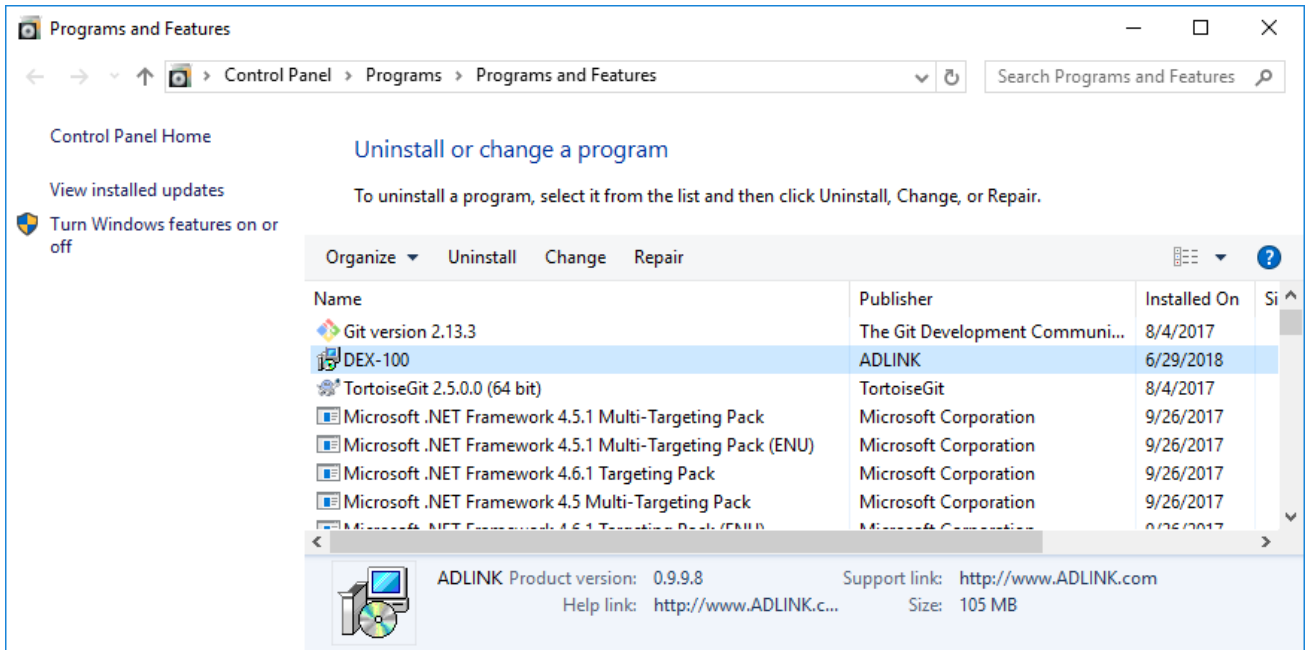


Fig.2-7 Run time stage connection example

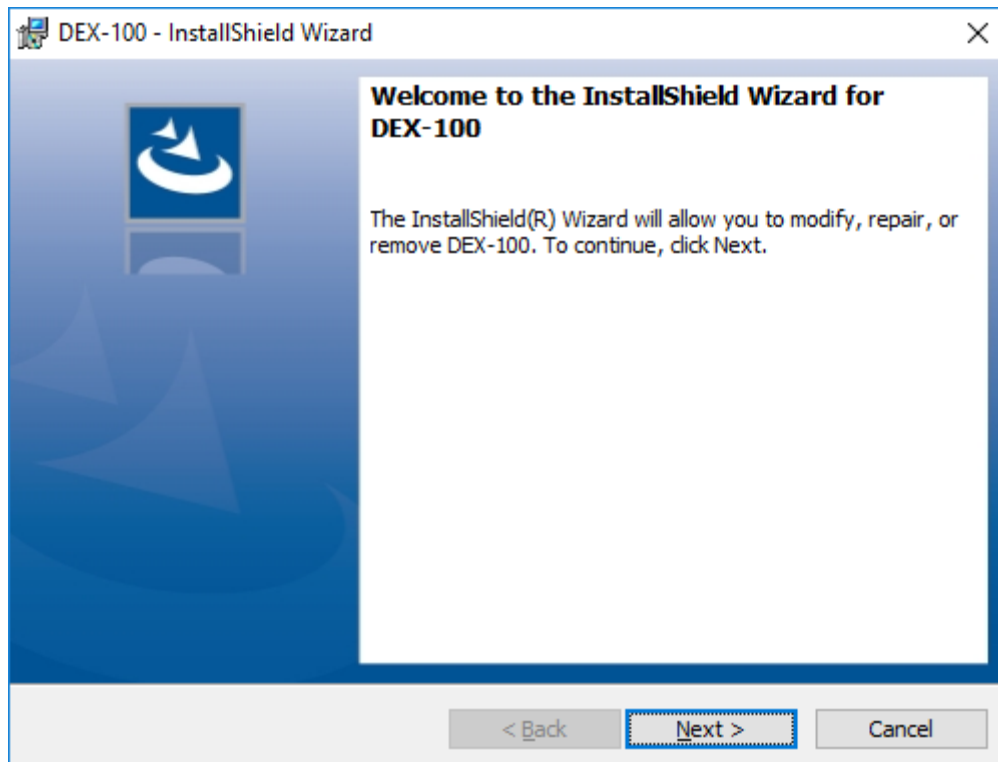
2.3. Update DEX-Pro Utility

This section provides instructions on how to update the DEX-Pro in your system. Prepare the DEX-100 SDK that comes with the package.

1. Uninstall the DEX-PRO software in Windows as following figure.



2. Reboot DEX-100.
3. Execute setup file of DEX-100 SDK, and follow the Installation steps.
4. When the installation window appears, click on the DEX-100 SDK installation button.

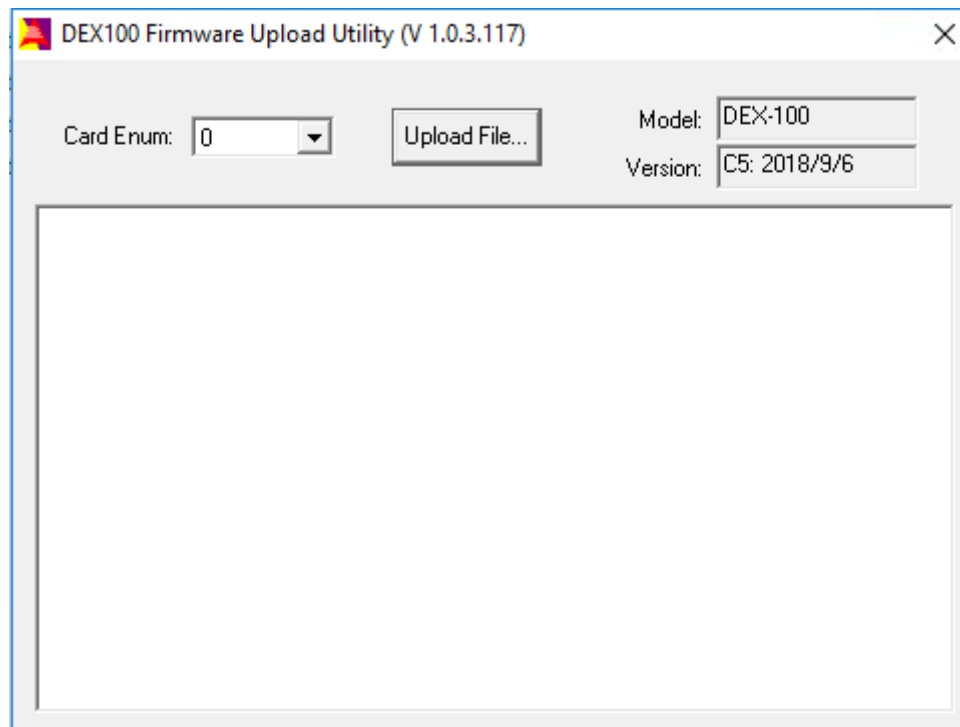


5. When installation is complete, reboot DEX-100
6. Launch DEX-Pro.

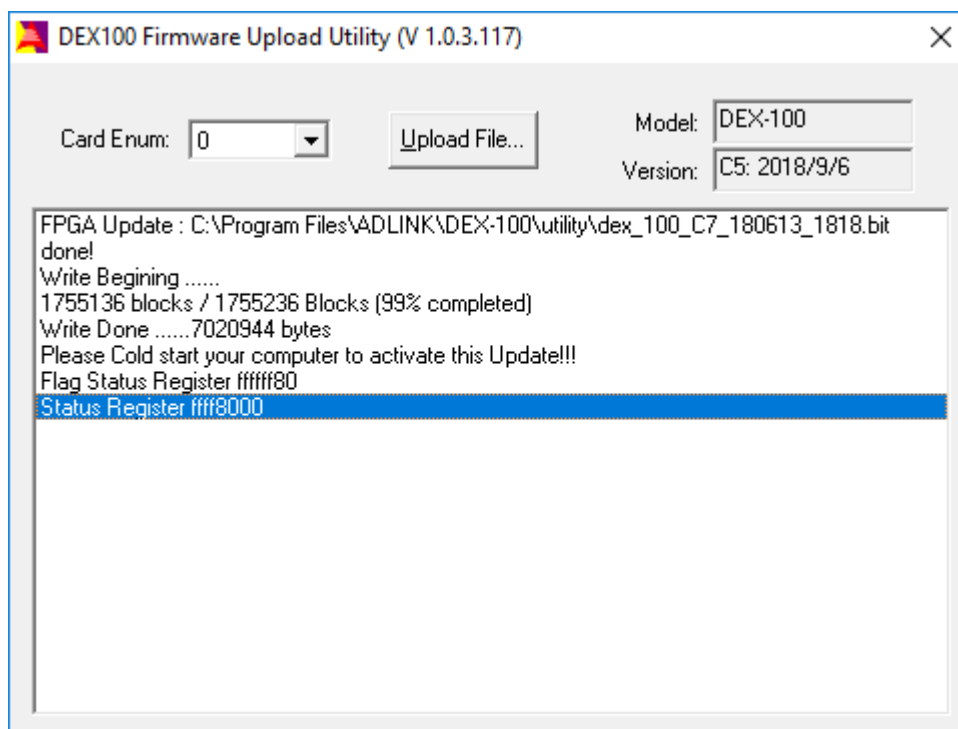
2.4. Update DEX-Pro FW

The following instructions show how to update the DEX-100 firmware in your system.

1. Execute <Dex-Pro>\utility\BurnDex100_x64.exe
2. Click Upload File and select bit file.



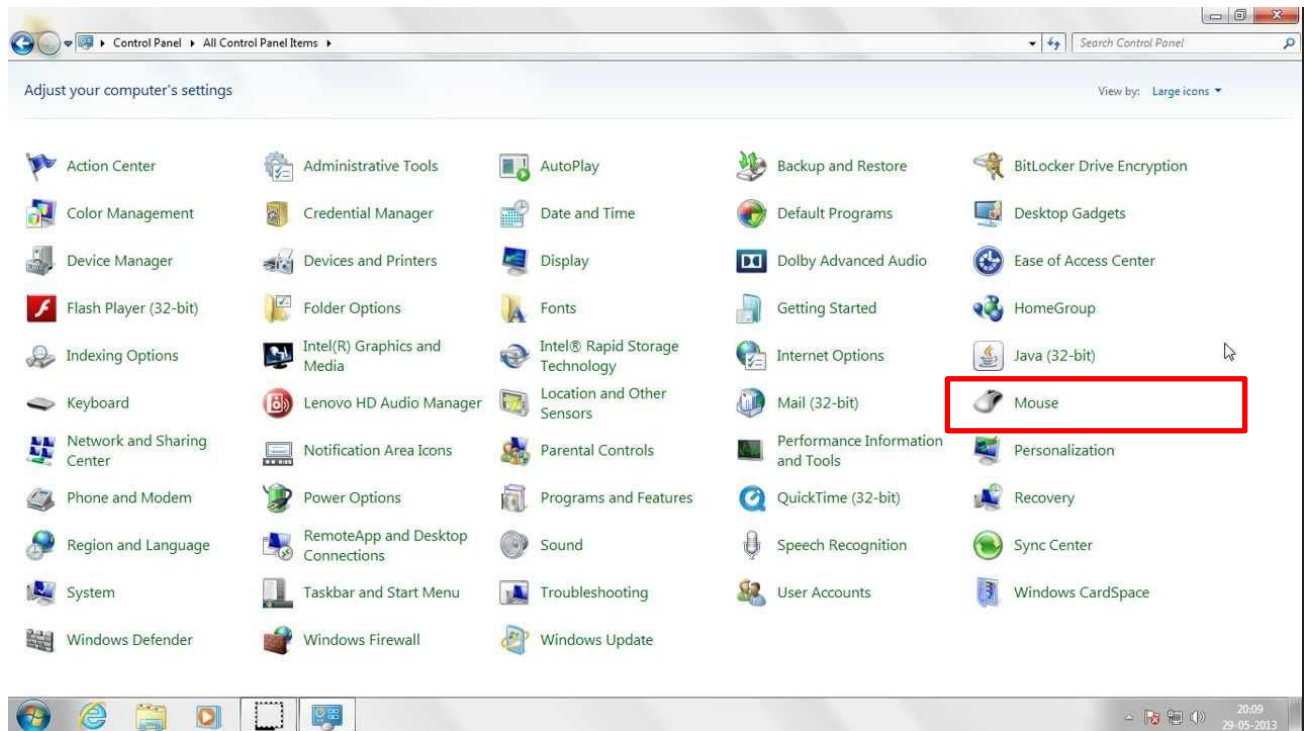
3. When the update is completed, COLD RESTART Dex-100.

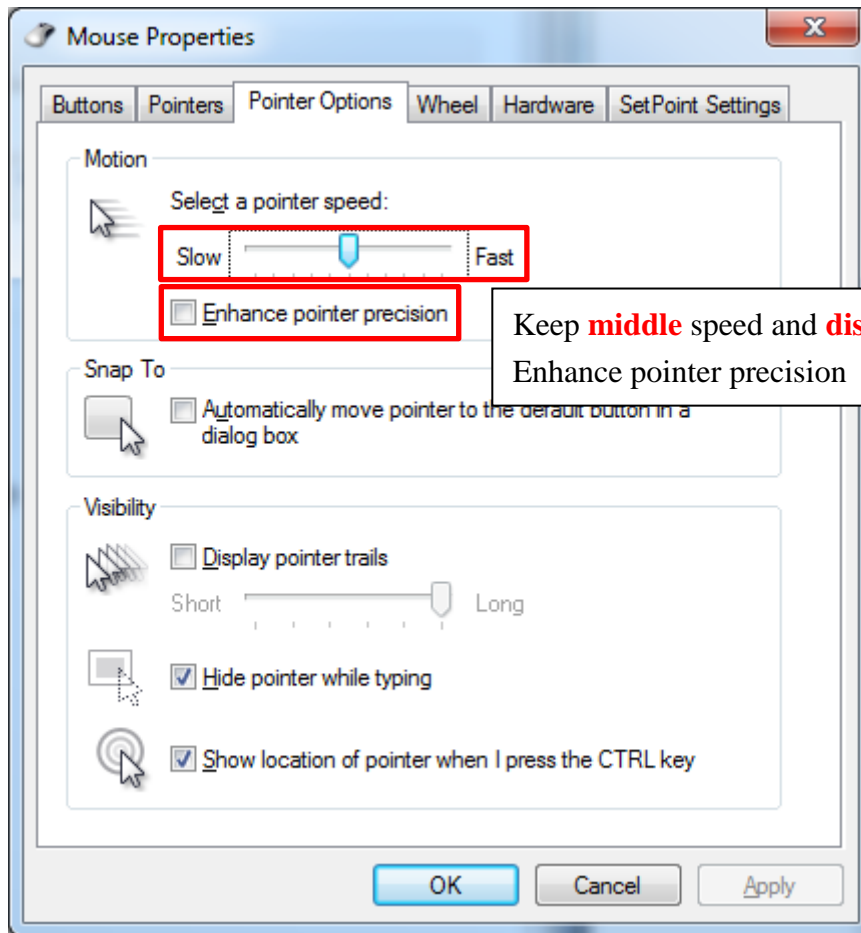


2.5. Target Machine's PC settings

We have to turn off the target machine's PC enhancement pointer precision to let mouse to be control smoothly.

E.g. Windows 7 :





3.DEX-Pro Workspace & Menus

The DEX-Pro interface includes the Menu bar, the Autorun Script panel, Config Script panel and Log panel.



Reload OCR DB: Select this button to reload the library when the target path's library changes.

Details of the elements are as follows.

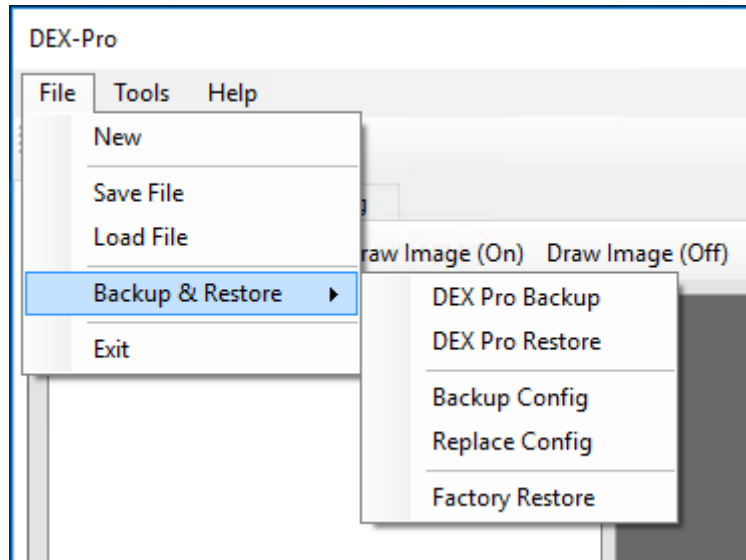
Group	Component Panels Supported
Auto Run	Run the script file automatically (HID time out/ digital input (DIN2))
Config Script	Run the script file manually. Edit and test the script file Include the page identification editor
Log	Log the DEX-Pro event process time, e.g: Log the some script instruction of execution time

3.1. Menu bar

3.1.1. Files menu

Contains functions for project file management.

New	Create the script file
Save file	Save current script to the script file folder
Load file	Load current script from a script file folder
Backup & Restore	
DEX Pro Backup	Backup the <ul style="list-style-type: none">● Init file backup● OCR data base backup● Schedule file backup● Program backup
DEX Pro Restore	Restore the <ul style="list-style-type: none">● Init file backup● OCR data base backup● Schedule file backup
Backup Config	Backup the <ul style="list-style-type: none">● DDS/LOG Config● Modbus Config● Machineini● Page Definition
Replace Config	Restore the <ul style="list-style-type: none">● DDS/LOG Config● Modbus Config● Machineini● Page Definition
Factory Restore	Restore the files to factory-refresh state: <ul style="list-style-type: none">● Init file restore● OCR data base restore
Exit	Close DEX-Pro Program



Backup & Restore

Backup and restore the DEX-Pro system described in this section. It divided two parts for backup and restore. One is the DEX Pro original configuration, script, OCR database on DEX Pro Backup/Restore and the other is DDS/REST, Modbus, Page identification, Log and machine initiation configurations on Backup/Replace Config.

Dex Pro Backup

There are four backup for DEX-Pro, and they are init file, OCR data base, schedule file, and program.

- Init file

It will copy shared.txt, OCR_M.ini, RCM_Auto.ini and RCM_Auto.lst files from "C:_" and "C:\Users\iot64\Documents\" to "backup folder\Dex-Pro_backup\" and "backup folder\Dex-Pro_backup\Documents"

They are the setting from script initiation, item content, Asi-ocr configuration setting parameters

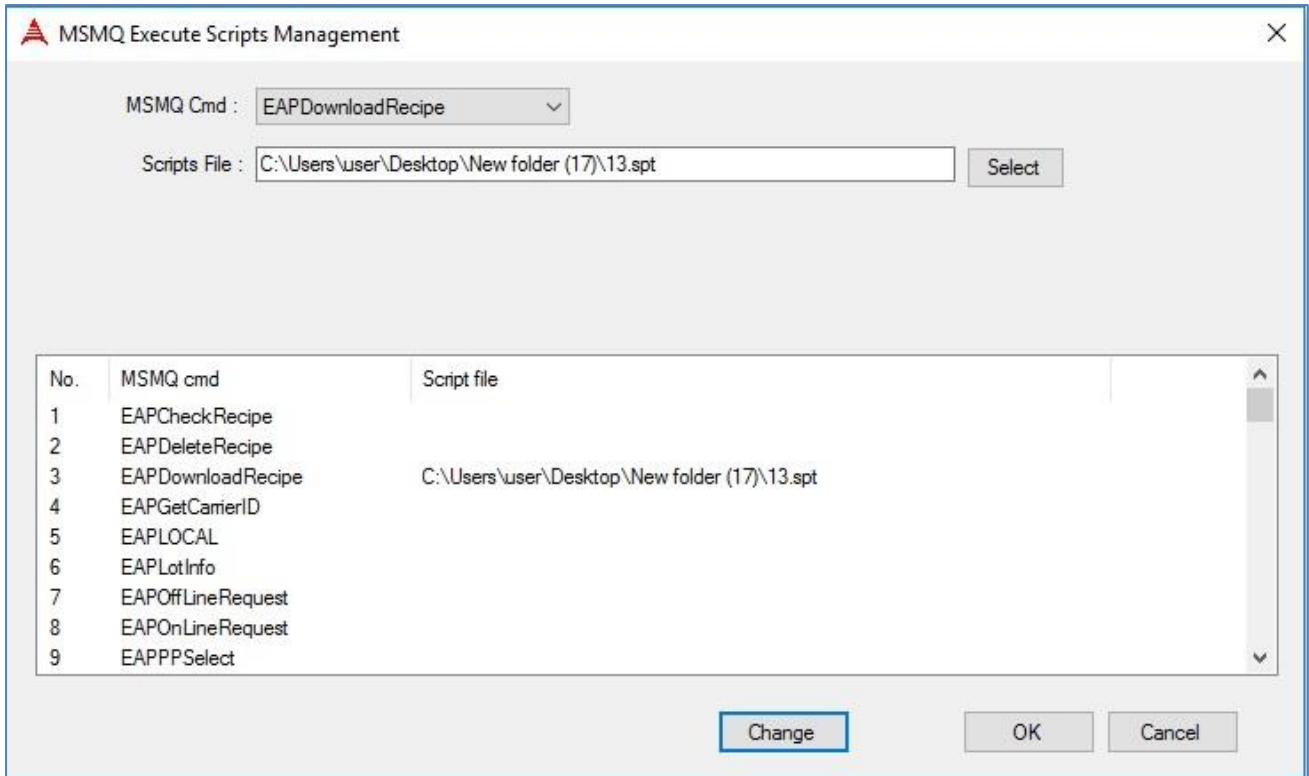
- OCR data base

It will copy the OCR data base templatefile.txt and TrainingData.bmp to "backup folder\Dex-Pro_backup\txt_db"

- Schedule file

It will copy the MSMQ Execute Scripts Management linked script to "backup folder\Dex-Pro_backup\spt"

Note: It only backup the linked the script as follow picture

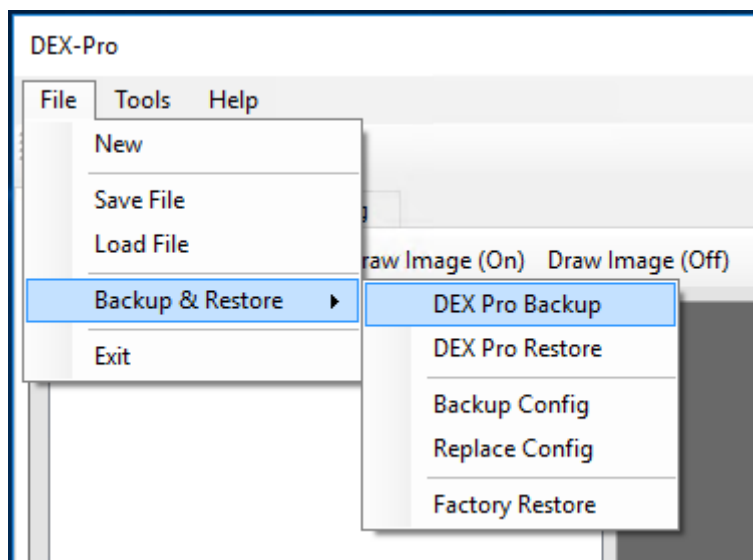


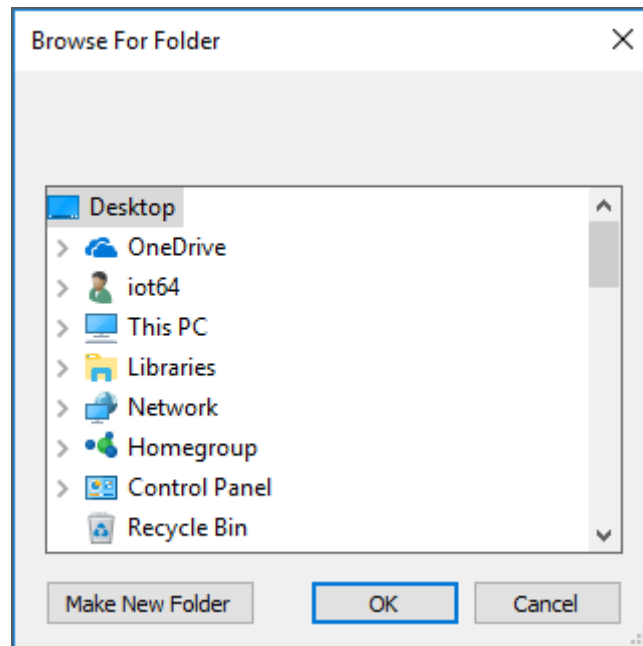
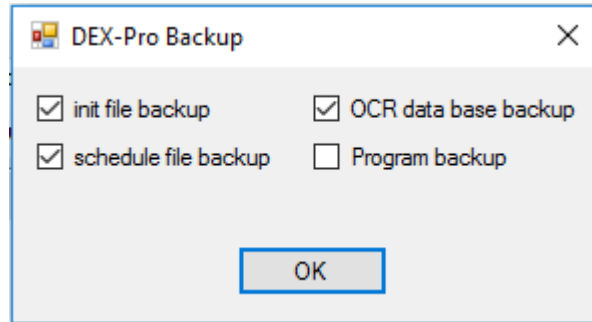
- Program backup

It will copy all files in “C:\Program Files\ADLINK\DEX-100\main” to “backup folder\Dex-Pro_backup\main”

We show the backup function step by step as follows.

- 1) File→Backup & Restore→DEX Pro Backup
- 2) Choose backup category
- 3) Choose which folder you will place the backup files and click “OK”





Dex Pro Restore

It is like the DEX Pro Backup, there are three restore for DEX-Pro, and they are init file, OCR data base, schedule file.

- Init file

It will restore shared.txt, OCR_M.ini, RCM_Auto.ini and RCM_Auto.lst files from "backup folder\Dex-Pro_backup\" and "backup folder\Dex-Pro_backup\Documents" to "C:\\" and "C:\Users\iot64\Documents\RVM_Config"

They are the setting from script initiation, item content, Asi-ocr configuration setting parameters

- OCR data base

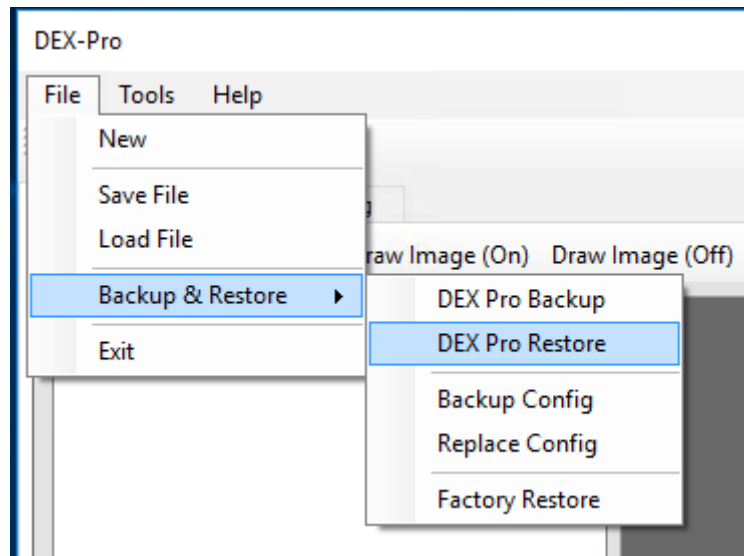
It will restore the OCR data base templatefile.txt and TrainingData.bmp from "backup folder\Dex-Pro_backup\txt_db"

- Schedule file

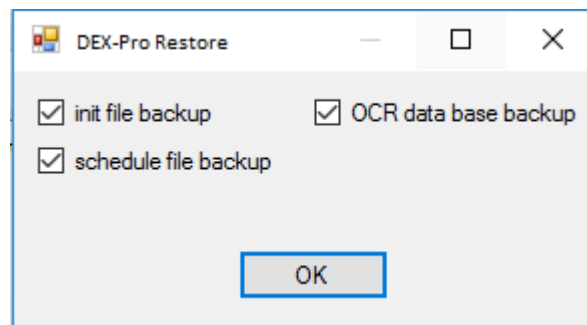
It will copy the MSMQ Execute Scripts Management linked script from "backup folder\Dex-Pro_backup\spt"

We show the backup function step by step as follows.

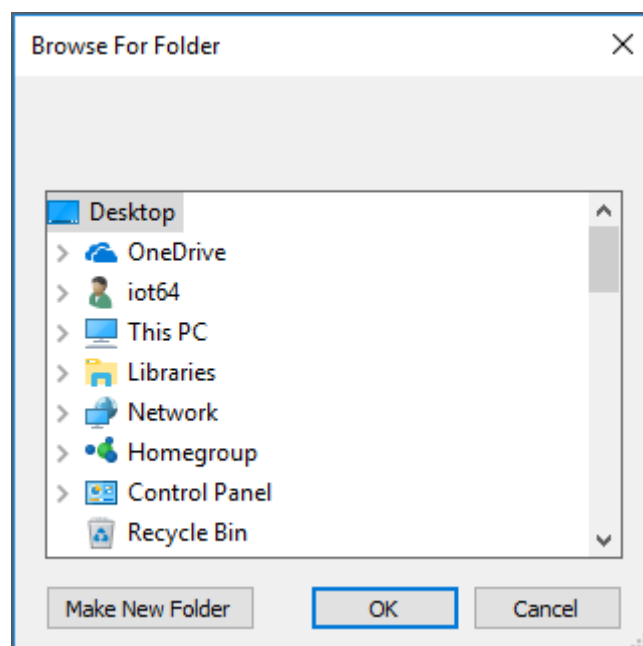
- 1) File→Backup & Restore→DEX Pro Restore



- 2) Choose restore category



- 3) Choose which restored files folder and click "OK"



- 4) Please restart the DEXPro

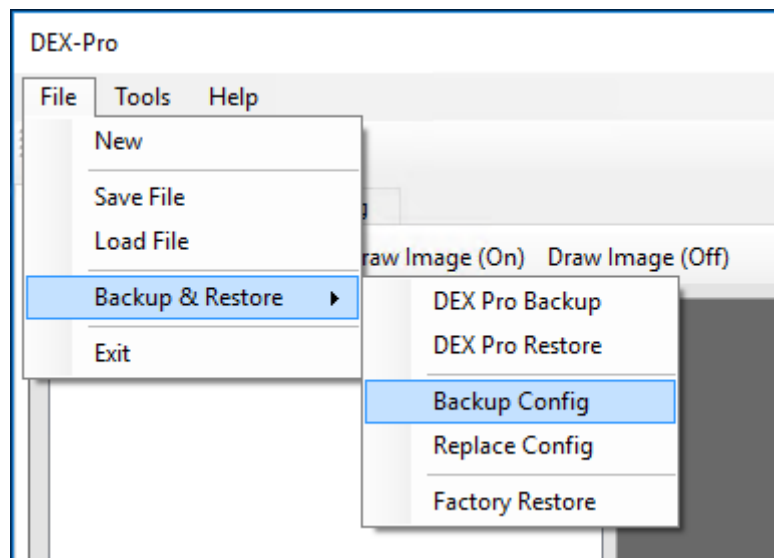
Backup Config

There are six xml configurations and one machine initial file on your system, we categorize five parts on these configuration.

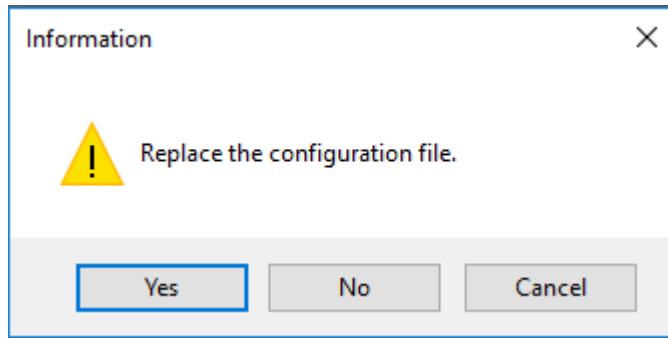
- DDS/REST configuration
- Log configuration
- Modbus configuration
 - a) Modbus command configuration
 - b) Modbus RTU configuration
 - c) Modbus TCP configuration
- Page Identification configuration
- Machine initiation file

So if you want to keep your xml configuration on your system, you need use this function to backup, and the backup files will be put on the Documents\RVM_Config folder. We will explain how to backup these configurations step by step as follow.

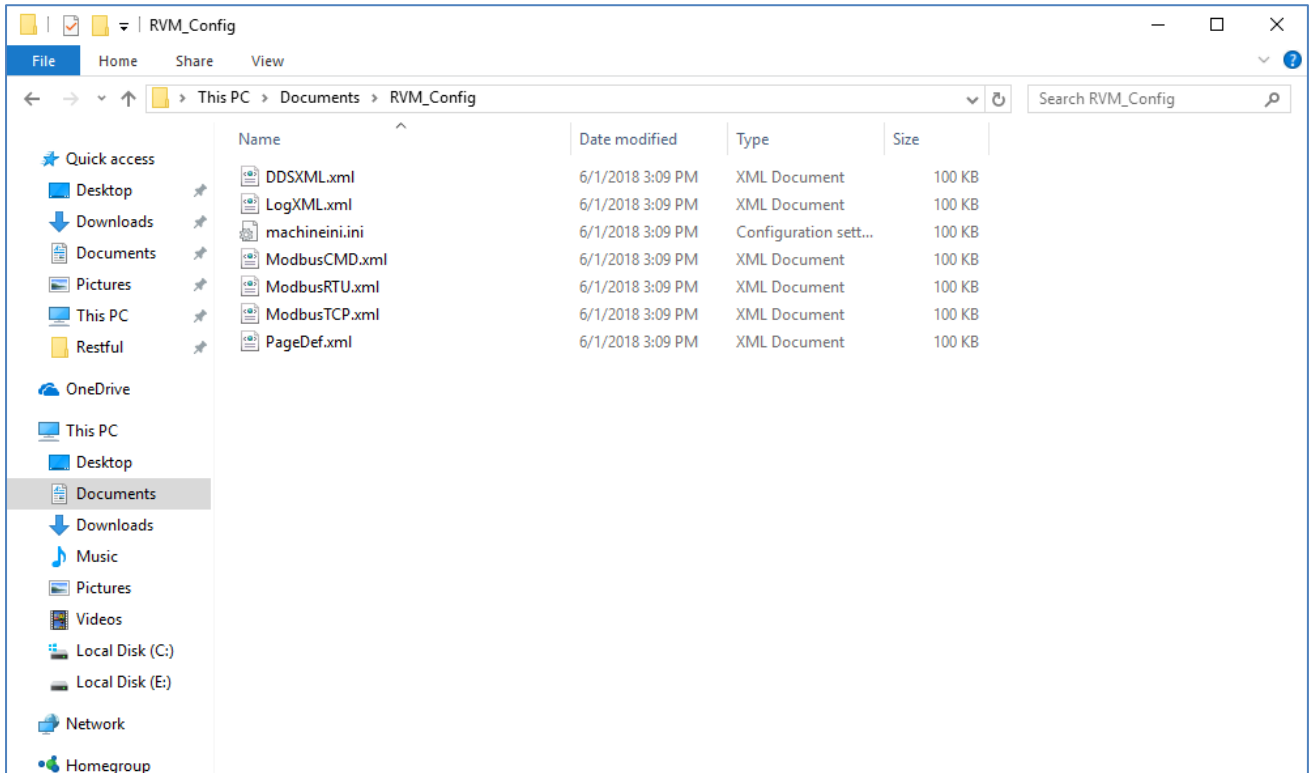
- 1) File→Backup & Restore→Backup Config



- 2) Click "Yes" to agree to backup



3) Check the backup files folder



Replace Config

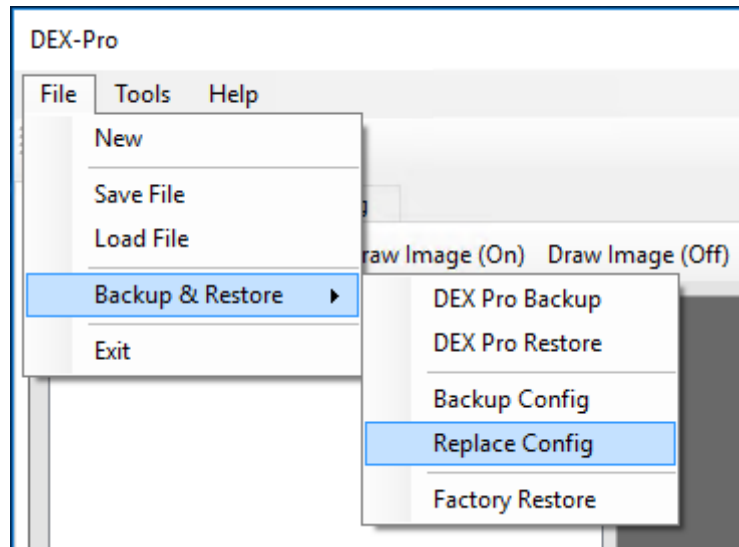
The same as Backup Config section, there are six xml configurations and one machine initial file on your system, we categorize five parts on these configuration.

- DDS/REST configuration
- Log configuration
- Modbus configuration
 - a) Modbus command configuration
 - b) Modbus RTU configuration
 - c) Modbus TCP configuration

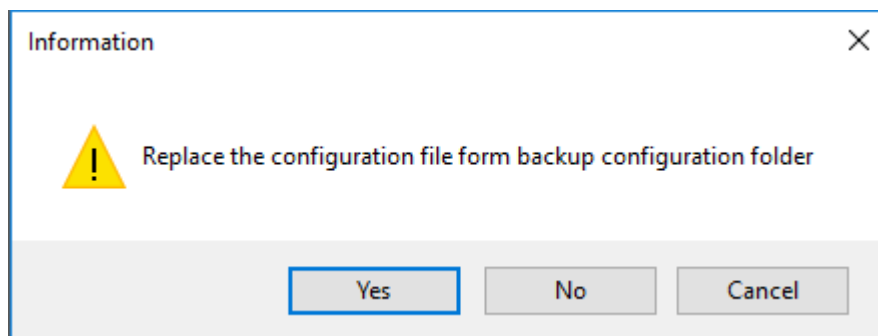
- Page Identification configuration
- Machine initiation file

If you want to restore your xml configuration on your system, you only use this function to restore, We will explain how to restore these configurations step by step as follow.

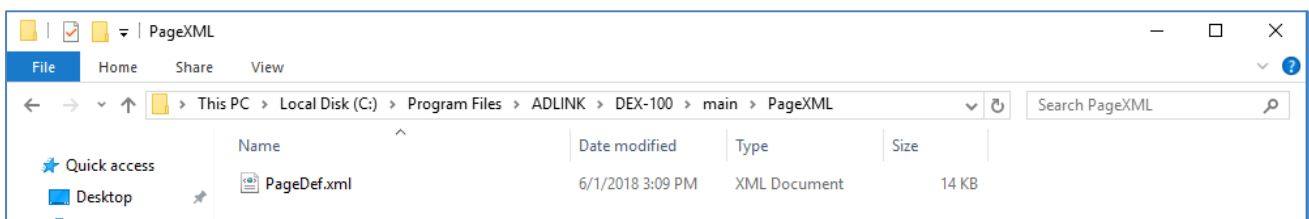
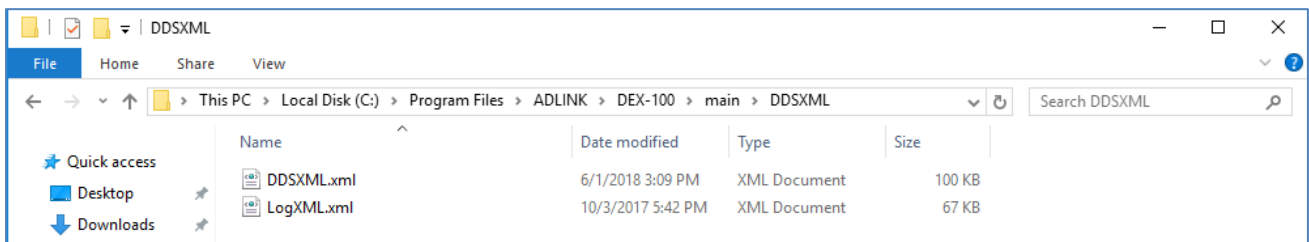
1) File→Backup & Restore→Replace Config

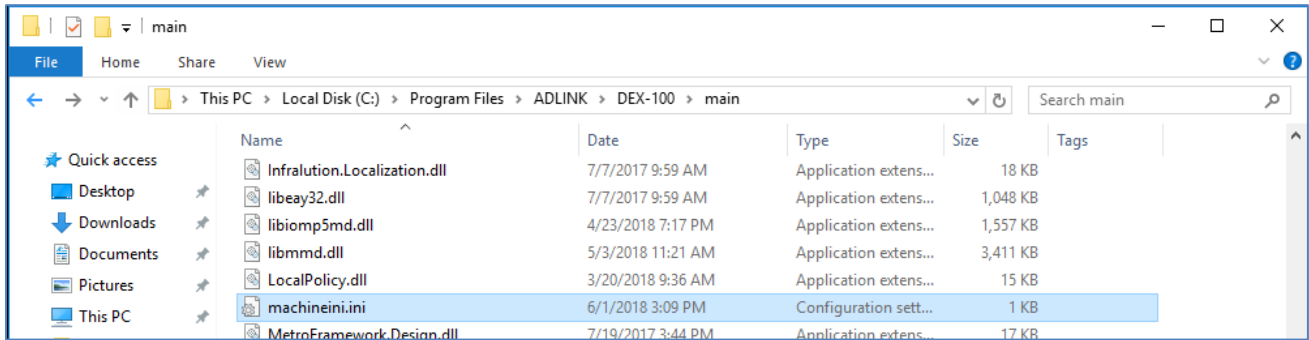
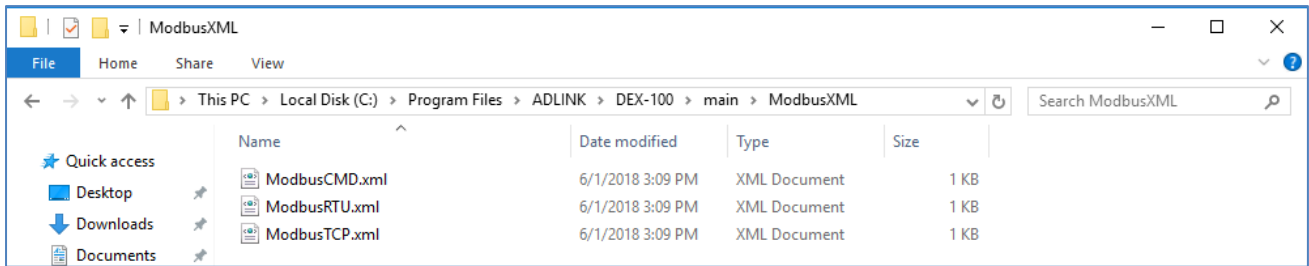


2) Click “Yes” to agree to restore



3) Check the restored result

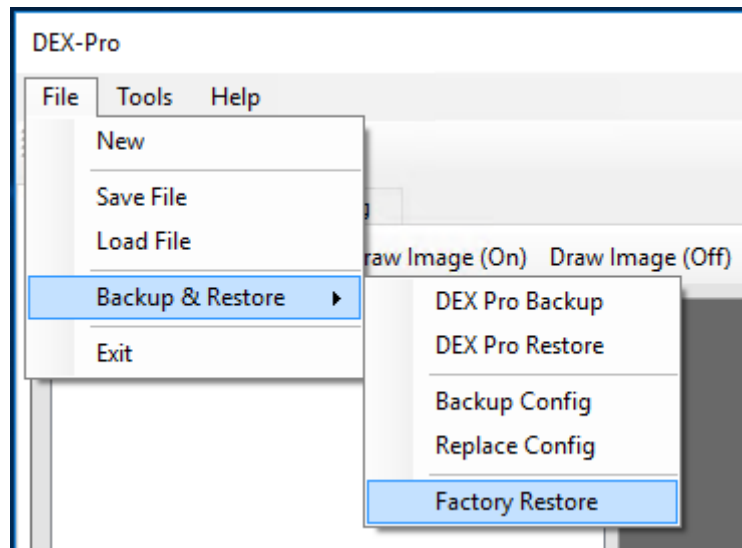


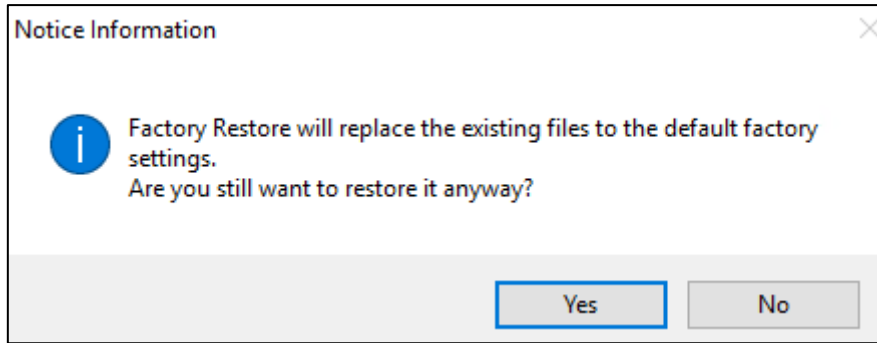


4) Please restart the DEX-Pro

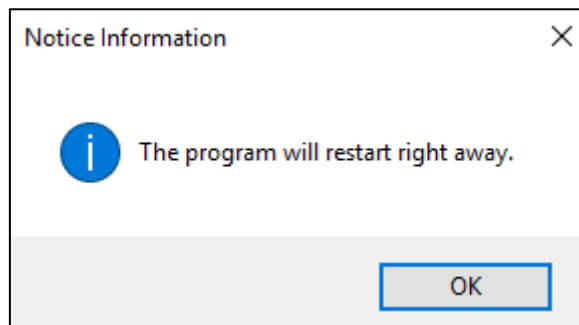
Factory Restore

“Factory Restore” can restore the Dex-Pro to the state which is just completely installed (factory-refresh). After you press the “Factory Restore”, there will show a message box to confirm that you really want to restore to the factory initial state. If you really want to restore to the factory-refresh state, click “Yes”. Otherwise click “No” to leave.





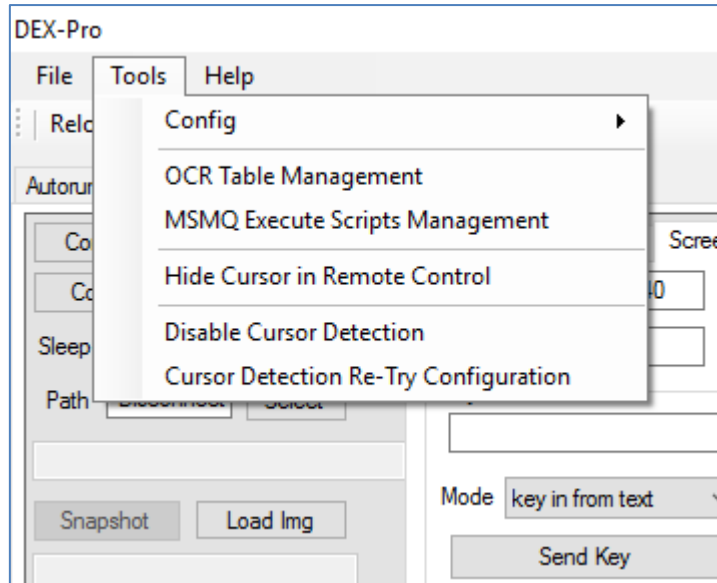
After Restoring to the factory-refresh state, there will show a message to let you restart the Dex-Pro immediately. After restart the Dex-Pro, the state is at the state which is just installed.



3.1.2. Tools menu

DEX-Pro tools for configuration, OCR table and log settings

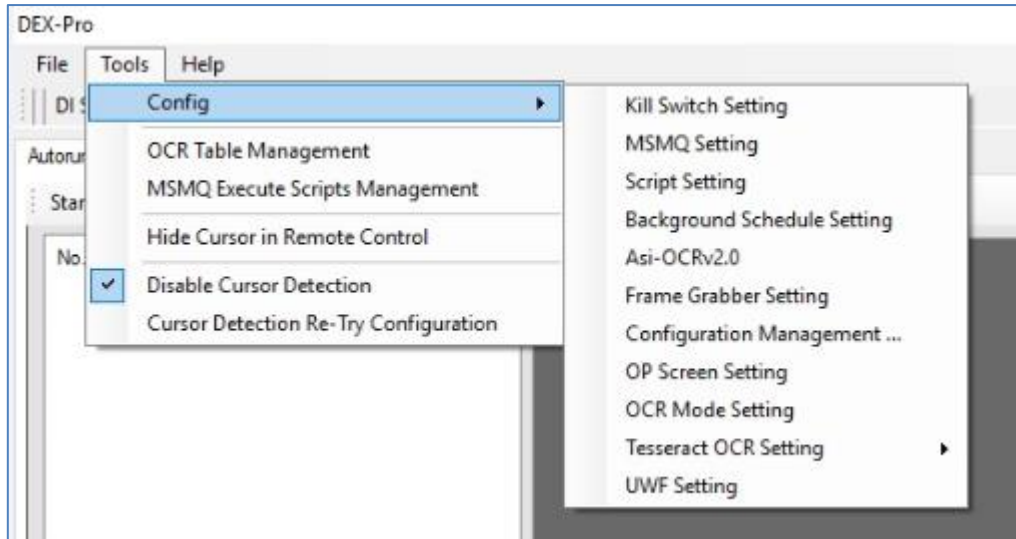
Config	See Config Menu
OCR Table Management	List the OCR Table value
MSMQ Excecute Script Management	MSMQ command list
Hide Cursor in Remote Control Panel	Hide local mouse cursor when using Remote Control Panel
Disable Cursor Detection	Enable/Disable Cursor Detection function
Cursor Detection Re-Try Configuration	Set the cursor detection retry times



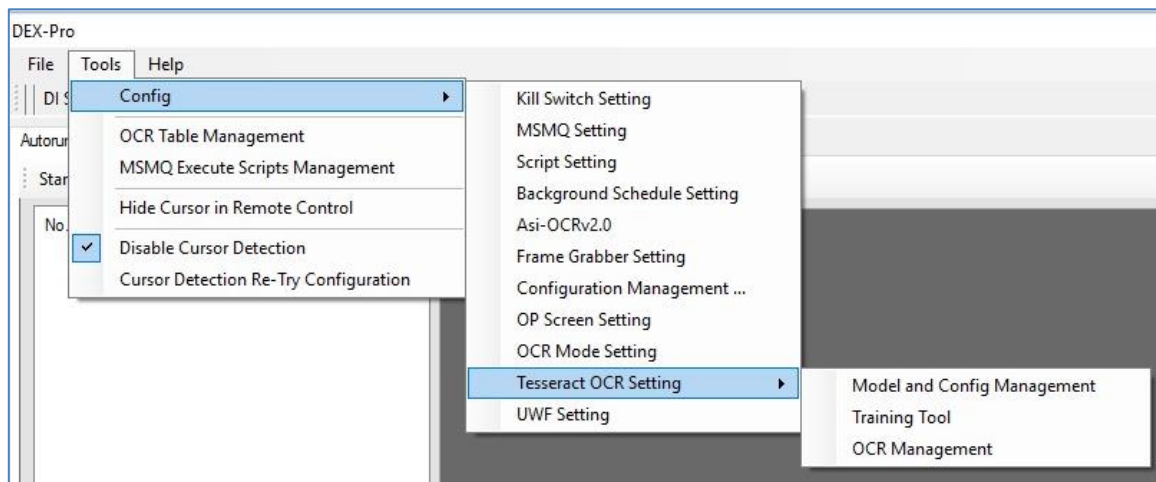
Tools

Config menu

Kill Switch Setting	Set protection to prevent some functions
MSMQ	Set the MSMQ name and label
Script Setting	Script latency setting
Background Schedule Setting	Trigger the script by HID detection or timer
Asi-OCR	Advanced OCR parameter (Global parameter)
Frame Grabber Setting	DEX-100 Frame Grabber setting
Configuration Management	Setting (Include the DDS / REST module, Data filter)
OP Screen Setting	OP Screen optional setting
OCR Mode Setting	Switch OCR mode to Asi-OCR either Tesseract
Tesseract OCR Setting	Tesseract OCR Setting <ul style="list-style-type: none"> ● Tesseract Model/Config Setting ● Training Tool for Tesseract
UWF Setting	UWF related settings

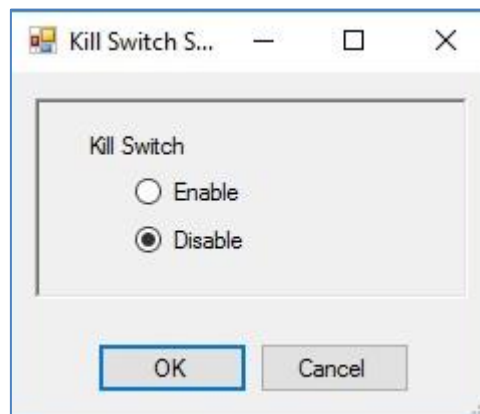


Asi-OCR Mode



Tesseract Mode

Kill Switch



If the “Kill Switch” setting is disabled, DEX-Pro remains operating as per normal.

Otherwise, when “Kill Switch” setting is enabled, then DI1 will have a new functionality as the “Kill Switch”, where:

- a. While DI1 circuit is closed (current applied between DI1 and COM), DEX-Pro shall remain operating as per normal.
- b. When DI1 circuit is opened (open circuit between DI1 and COM), DEX-Pro must be “disabled” such that:
 - i. Any scripts that are currently executing, either started by AutoRun mode, or Manual run, or started by MSMQ, or started by DI2, must be immediately stopped.
 - ii. DEX-100’s control mode must be immediately switched back to “Full Operation Mode”
 - iii. When the script is stopped in (i) and the Disconnect SptStatus message with is published by REST/DDS modules, the disconnect reason would be given a disconnect reason.
 - iv. Any further attempts to start a script, either by AutoRun button, or Manual run button, or MSMQ trigger, or DI2 trigger, must be prevented.
 - v. In case of attempts to start a script by AutoRun button or Manual run button, error message box with clear reason that DEX-Pro has been disabled by the Kill Switch.
 - vi. In case of attempts to start a script by MSMQ trigger, error message with clear reason that DEX-Pro has been disabled by the Kill Switch, shall be returned to the host instead of the usual success message.
 - vii. When DEX-Pro publishes out the SysMode message through REST/DDS modules, it shall publish using a new number as the “disabled” mode. This allows the host to identify that DEX-Pro has been disabled.
 - viii. In case of attempts to read any register in DEX-Pro, such as by using MSMQ GetXXValue request, or by using REST/DDS MachineStatus request, an error with a clear reason message shall be returned to the host instead. This allows the host to identify that DEX-Pro has been disabled, and prevents the host from getting stale data.
- c. When DI1 circuit is closed again, DEX-Pro operations shall be reverted to normal, such that scripts could be started like normal, and especially if a script is supposed to be started by the HID timeout feature, it shall be eventually started (HID timer countdown is reset when the DI1 circuit is closed again).

MSMQ Setting

MSMQ Setting

MSMQ Send

Target IP: 127.0.0.1

Queue: EAP.EQP001.To.OLP

Label:

MSMQ Rcvd

Queue: OLP.EQP001.To.EAP

Label:

Change Cancel

- 1) **Target IP:** The IP of target for DEX-100 sends message. Use 127.0.0.1 for sending a local message
- 2) **Queue:** The specified queue to send and receive message
- 3) **Label:** label can be blank or available to customers

Script Setting

Script Setting

Time Stop(ms) 5 Spt Step Speed(ms) 5

DEX-Pro Minimized

Saving Image Format JPEG PNG

Change Cancel

- 1) **Time Stop (ms):**

Base time to sleep after each script instruction is executed.

- ※ Note: Base time the stop time required to multiply the scheduling instruction is the actual stop time of the scheduling instruction. So the sleep time is the Time Stop X Sleep, Time Stop is base time and Sleep of instruction setting is the multiple. It must uncheck the “DEX-Pro Speed Up” to enable this function.

Scheduling instruction set

Show note

Instruction: Send OCR Note: Send OCR

X: 0

Y: 0

W: 0

H: 0

Q: 0 Note: 0:All, 1:Digit, 2:Lower Alpha, 4:Upper Alpha, 6:Alpha

Text: C:_OCRFile_0.bmp

Sleep: 3 Waiting time between Instructions

Back group: getimg_001.bmp

Remark: none Show Remark

Unique cfg: none Set cfg

Similarity: Default is 1. In the blur of image distortion similar phenomenon, reducing this value can improve Identify accuracy

Multi-Character Format: null

Tesseract DB:

Default: 100.

2) Spt Step Speed (ms):

Time to wait in DEX-Pro program switch command.

Default: 100

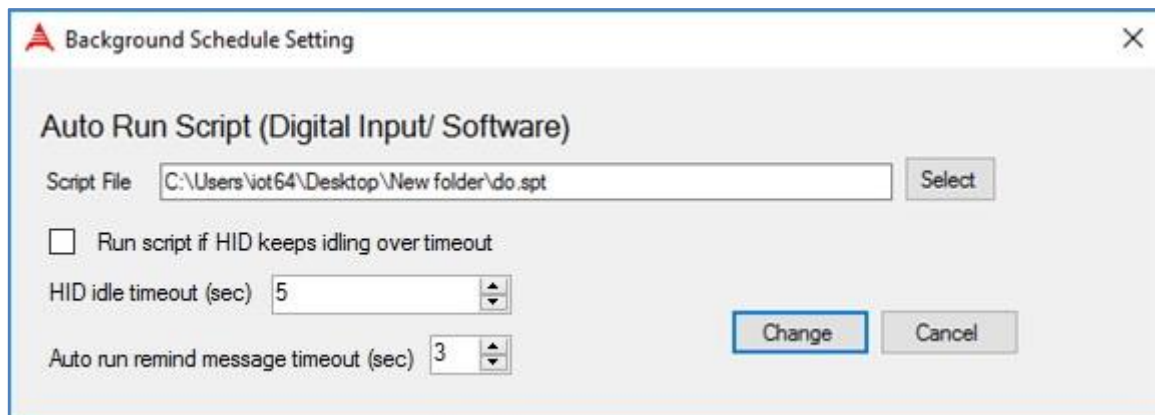
3) DEX-Pro Minimized:

The program will be minimized when DEX-Pro lunched.

4) Saving Image Format: (It is used on command “Get bmp rect array”)

Choose the saving image format for the full screen image

Background Schedule Setting



1) **Script File:**

Path of the script file to run.

2) **Run script if HID keeps idling over timeout:**

Enable or disable auto-run script function. Script file will be launched when there is no keyboard or mouse input over timeout.

3) **HID idle timeout (sec):**

Timeout value in second for the mouse keeping not moving

4) **Auto run remind message timeout (sec):**

Timeout value in second for the screensaver

Asi-OCR Tool

You need to train the OCR result in advance with OCR_tool.exe

Program path: C:\Program Files\ADLINK\DEX-100\main\OCR_tool.exe

Please use OCR_tool.exe

Click Tools->Set config

- 1) **Txt DB Config:** Dictionary database configuration to identify the database location for text.
 - **TXT File:** Dictionary file files path.
 - **Big Img File:** Dictionary Chart path.
 - **delete DB file:** Delete the templatefile.txt and TrainingData.bmp
 - **new distance:** If checked, in debug view will be shown the blank when character has many blank lines distance to underscore
 - **OCR Save Mode:**
 - i. No Save to db: If there is new character, it won't save to word db
 - ii. No Chk One: It doesn't use the Asi-ocr pattern match function
 - iii. No Chk More: It uses the Asi-ocr pattern match, but not match again for single character
 - iv. No Use OCR: It doesn't use the opencv ocr function
 - v. make same high: Make the all images the same high and do preprocessing
- 2) **Blur:** Color Range and Word Color Threshold are fine settings compare to the Back group color range and Later color threshold.
- 3) **Back group color range:** Picture noise, picture to gray scale, adjacent point chromatic aberration is less than this value is white, greater than this value is black.
- 4) **Later color threshold:** Picture chromatic aberration threshold percentage value, after the picture turns the gray scale, makes the color judgment to the black position; the larger the value retains the more black spots.
- 5) **Back Group Min rect (w x h):** Picture minimum background range (width x height), the area within the range of chromatic aberration needs to be greater than this value before it is painted as a white black word.
- 6) **Minimum black grid:** Minimum pixel number between two characters. It will treat there exists blanks when the pixel number of two characters larger than this value.

- 7) **Cut Word:** Word split manner, normal way and precise way.
 - a) Normal: It reflect the truly image, so it make every joined characters to a character
 - b) Precise: Make every character a white space even if any two joined characters
- 8) **checksame:** Identify the similarity; default to 1 reduces this value to improve the accuracy of the image when there is a distortion similar to the residual shadow.
- 9) **Char not indented:** Check it, it will not remove the white space on character up and down.
- 10) **Word rect (W x H):** Identify the width of the picture's threshold value, affect the use of the identification similarity, temporarily do not use.

Asi-OCR v2.0: Asi OCR parameter Settings

- 1) **Txt DB Config:** Dictionary database configuration to identify the database location for text.
 - **TXT File:** Dictionary file files path.
 - **Big Img File:** Dictionary Chart path.
 - **Compute Checksum:** This button will generate the checksum value from the selected TrainingData.bmp and store into the specific file.
- 2) **Background color range:** Picture noise, picture to gray scale, adjacent point chromatic aberration is less than this value is white, greater than this value is black.
- 3) **Later color threshold:** Picture chromatic aberration threshold percentage value, after the picture turns the gray scale, makes the color judgment to the black position; the larger the value retains the more black spots.
- 4) **Minimum blank pixels:** the smallest blank pixel length between words and characters, and if the white space pixel length is greater than this value, it is treated as a space between words and words.
- 5) **Back Group Min rect (wxh):** Picture minimum background range (width x height), the area within the range of

chromatic aberration needs to be greater than this value before it is painted as a white black word.

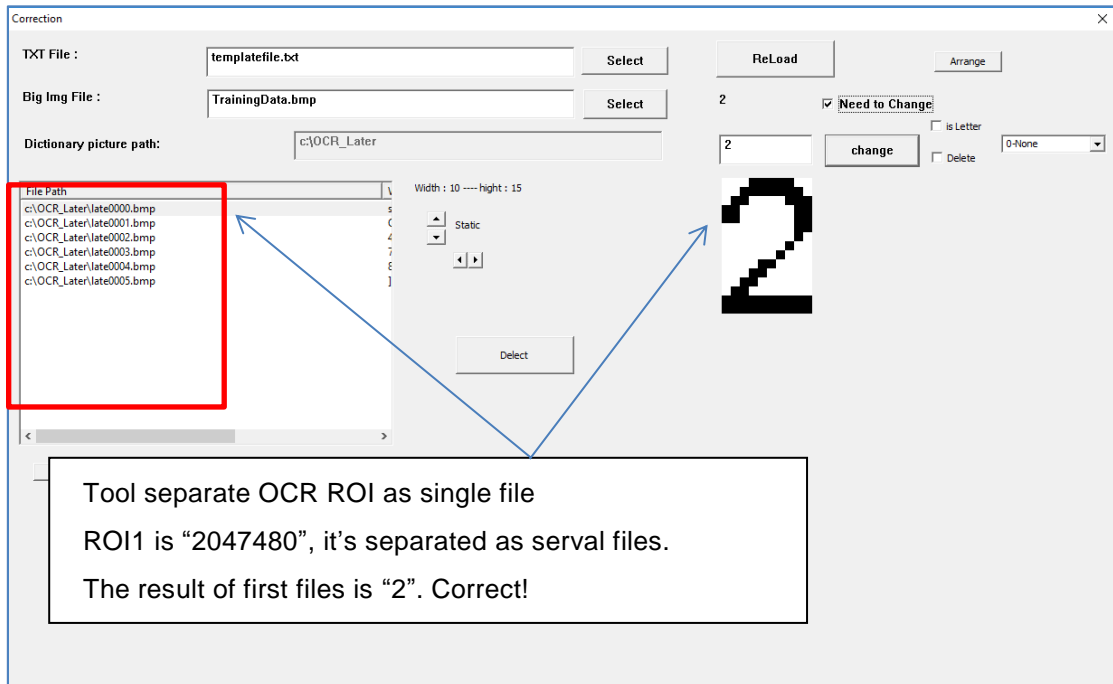
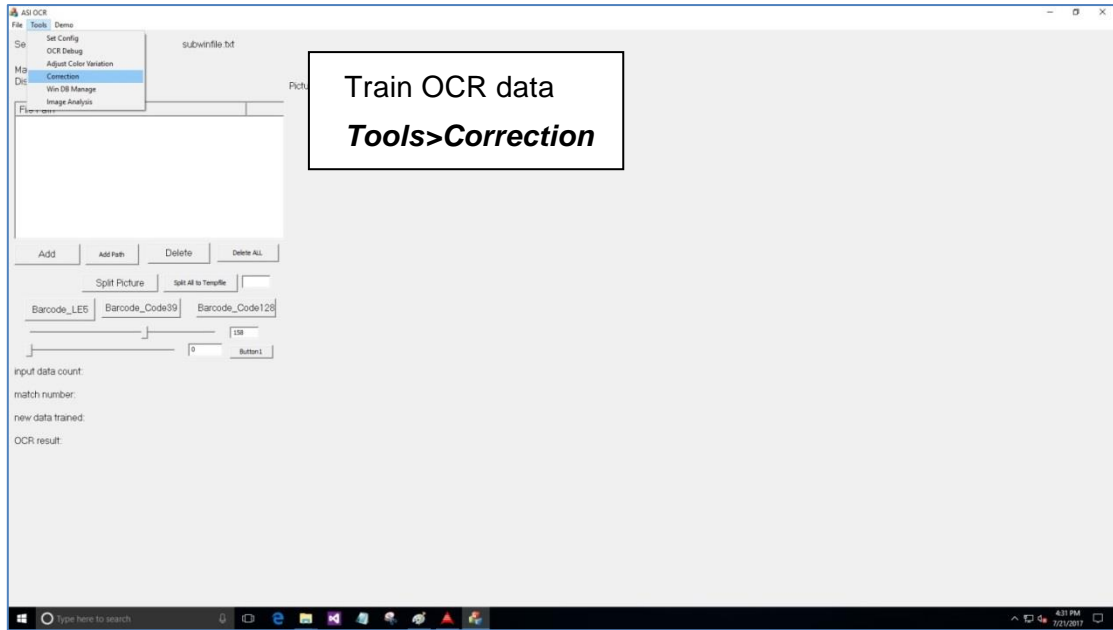
- 6) **Similarity:** identify the similarity; default to 1 reduces this value to improve the accuracy of the image when there is a distortion similar to the residual shadow.
- 7) **W x H:** identify the width of the picture's threshold value, affect the use of the identification similarity, temporarily do not use.
- 8) **Debug:** To turn on or off debug mode, to perform the relevant instructions for identifying pictures on open, and to store the information required for debugging.
- 9) **Color 1 ~ Color 4:** Preset color identification settings, provide the purpose of color identification instructions
- 10) OCR Save Mode:
 - a) No Save to db: If there is new character, it won't save to word db
 - b) No Chk One: It doesn't use the Asi-ocr pattern match function
 - c) No Chk More: It uses the Asi-ocr pattern match, but not match again for single character
 - d) No Use OCR: It doesn't use the opencv ocr function
 - e) make same high: Make the all images the same high and do preprocessing
 - f) Adlink table: Force the OCR result to replace to the format character (N, L, I, W)
- 11) Cut Word:
 - a) Normal: It reflect the truly image, so it make every joined characters to a character
 - b) Precise: Make every character a white space even if any two joined characters
- 12) Char not indented: Check it, it will not remove the white space on character up and down

A rectangular button with a double border and a light gray background. The text "ReLoad DB" is centered in a monospaced font.

Re-read glyph database

A rectangular button with a double border and a light gray background. The text "Set Config" is centered in a monospaced font.

Set the configuration archive



The screenshot shows the 'Correction' window with the following fields and controls:

- TXT File: `templatefile.txt` (with 'Select' and 'ReLoad' buttons)
- Big Img File: `TrainingData.bmp` (with 'Select' button)
- Dictionary picture path: `c:\OCR_Later`
- File Path list (highlighted in red):
 - c:\OCR_Later\late0000.bmp
 - c:\OCR_Later\late0001.bmp
 - c:\OCR_Later\late0002.bmp
 - c:\OCR_Later\late0003.bmp
 - c:\OCR_Later\late0004.bmp
 - c:\OCR_Later\late0005.bmp
- Character correction area: A character 'Q' is shown in a box, with a 'change' button next to it. A 'Need to Change' checkbox is checked. Other options include 'is Letter' (unchecked), 'Delete' (unchecked), and a dropdown menu set to '0-None'.

Blue arrows point from the red box to the 'Q' character and the 'change' button.

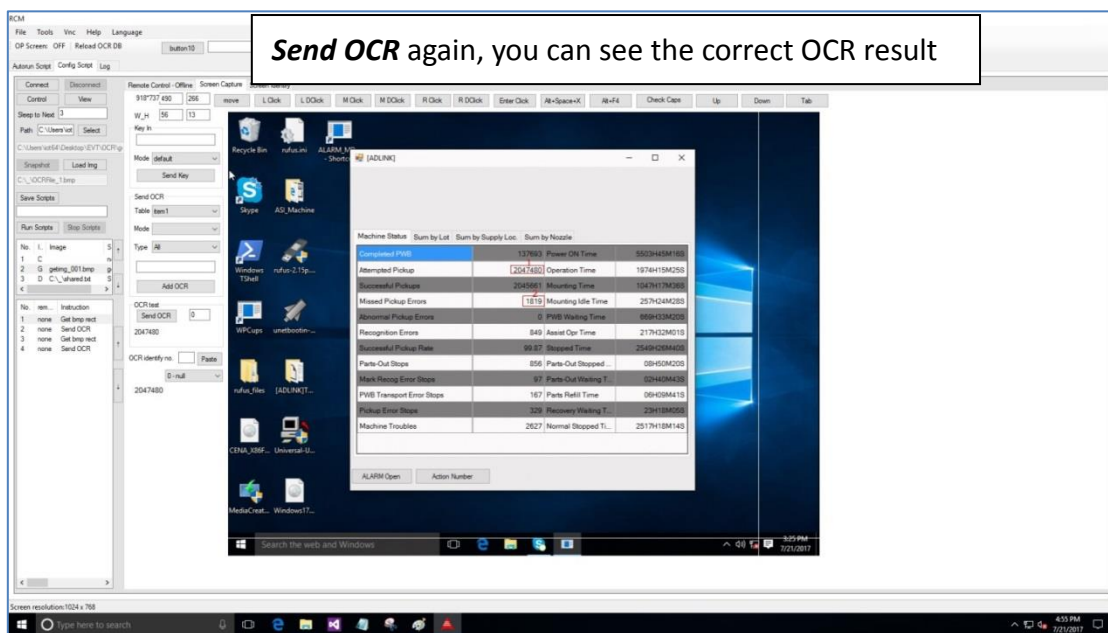
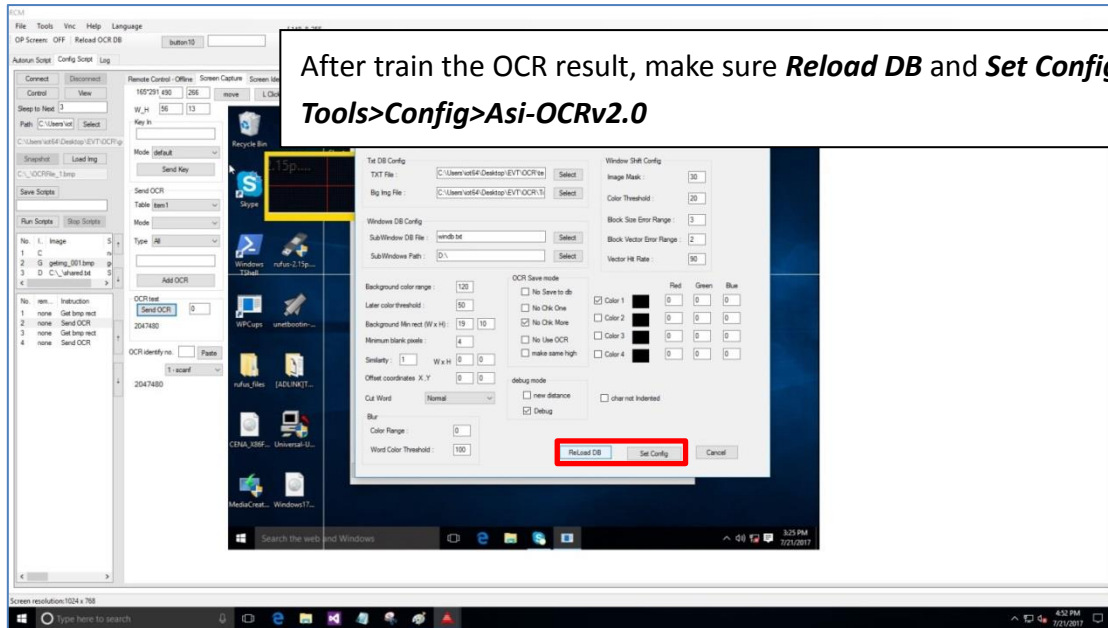
ROI1 is "2047480", it's separated as several files.
The result of second files is "Q". Incorrect!
It should be filled "0" into textbox and click **change**.

The screenshot shows the 'Correction' window with the following fields and controls:

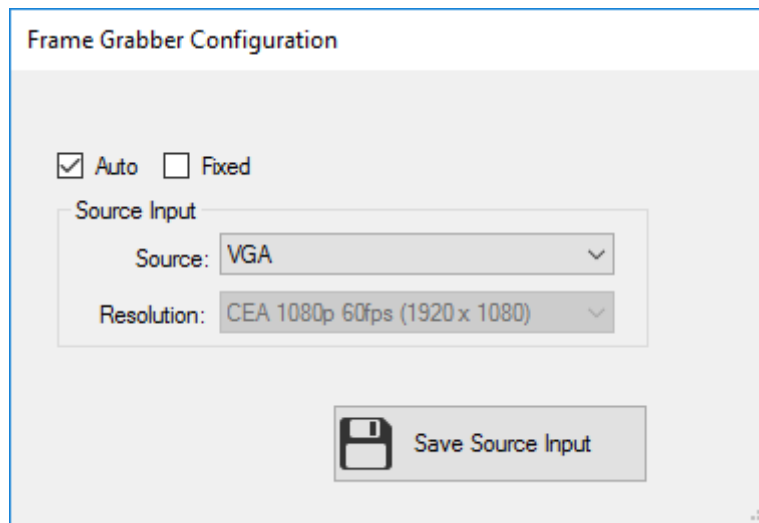
- TXT File: `templatefile.txt` (with 'Select' and 'ReLoad' buttons)
- Big Img File: `TrainingData.bmp` (with 'Select' button)
- Dictionary picture path: `c:\OCR_Later`
- File Path list (highlighted in red):
 - c:\OCR_Later\late0000.bmp
 - c:\OCR_Later\late0001.bmp
 - c:\OCR_Later\late0002.bmp
 - c:\OCR_Later\late0003.bmp
 - c:\OCR_Later\late0004.bmp
 - c:\OCR_Later\late0005.bmp
 - c:\OCR_Later\late0006.bmp
 - c:\OCR_Later\late0007.bmp
- Character correction area: A character 'd' is shown in a box, with a 'change' button next to it. A 'Need to Change' checkbox is checked. Other options include 'is Letter' (unchecked), 'Delete' (unchecked), and a dropdown menu set to '0-None'.

Blue arrows point from the red box to the 'd' character and the 'change' button.

ROI1 is "2047480", it's separated as several files.
The result of 4th files is "d". Incorrect!
It should be filled "74" into textbox and click **change**.
Sometimes, the result will be identified as multi-words



Frame Grabber Setting Panel



1) **Auto:**

Enable or disable auto-detection of input resolution for video source. Auto-detection may fail when video signal is not analyzable for DEX-Pro; manually select the resolution is need in this case.

2) **Fixed:**

When video signal is not analyzable for DEX-Pro, you can check the “Fixed” and choose the best resolution for your machine.

3) **Source:**

Select VGA or DVI input.

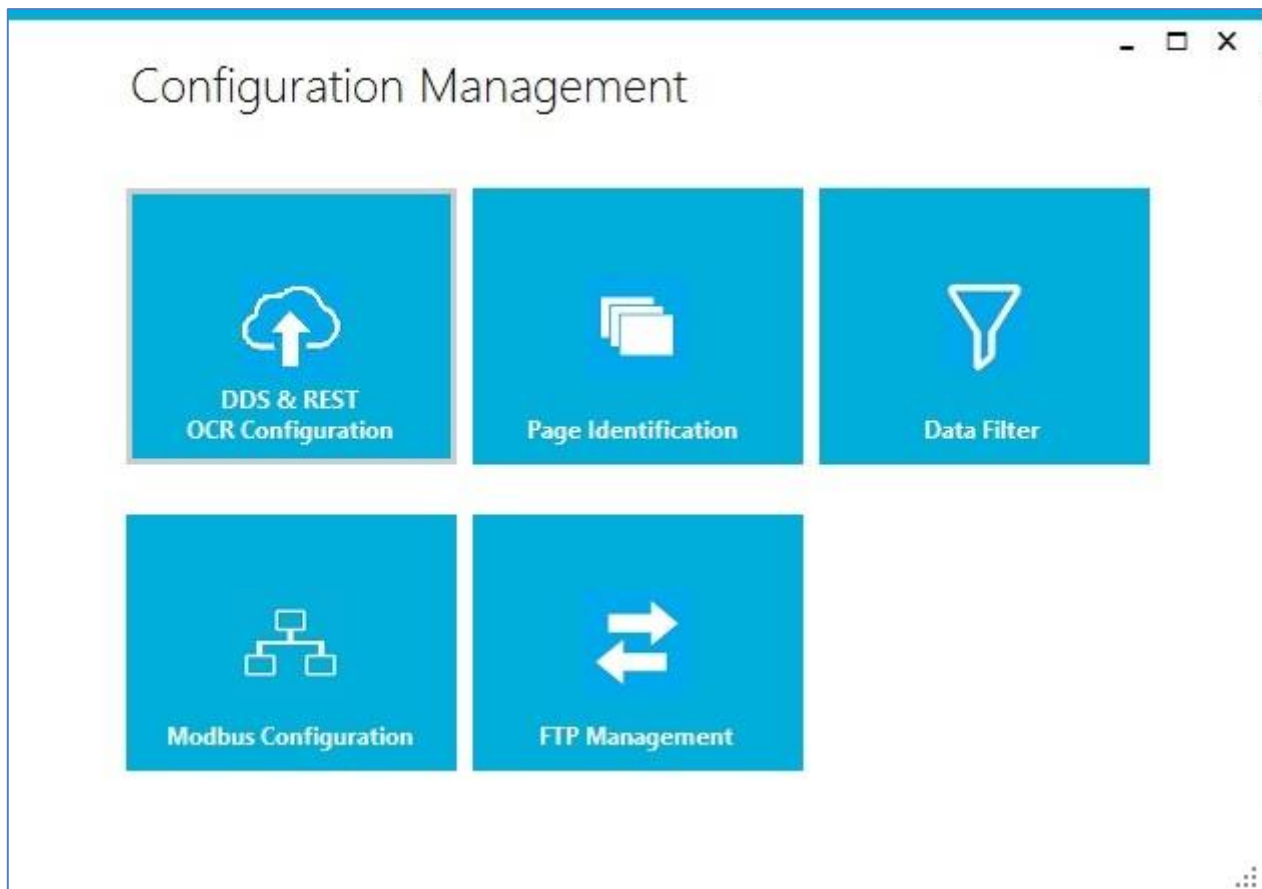
4) **Resolution:**

Support resolutions list for manual selection.

5) **Save Source Input:**

Confirm frame grabber setting on “Auto” or “Fixed” mode.

Configuration management



DDS OCR configuration	Define the machine status table
Page identification	Define the page description
Data Filter	Data Table filtering
Modbus configuration	Modbus setting form
FTP Management	FTP setting form

DDS & REST OCR Configuration

The properties also include a description for each ROI so the Data grid will be able to display the ROI and Datatype, Description together with the setting. Whenever a ROI is selected in the Data grid then the configuration of the ROI will be displayed under the Data Configuration in a separate ROI index.

The image layer and ROI rectangle corresponding to selected item will be displayed on the right-hand side panel. Before display the ROI rectangle on the panel, it requires to load image layer in main program.

Use the Communication Module Configuration menu to set the Machine Configuration group box (include the host name/port number), and the Communication Module Configuration group box.

Machine Configuration

- 1) Module: This selection let you choose the sending module.
- 2) Host Name: Destination of the receiver's IP.
- 3) Port: Destination of the receiver's port.
- 4) Machine ID: Current DEX-Pro's present ID.
- 5) Machine Name: Current DEX-Pro's present name.

After all the setting are completed, press "Modify and Save" to store the settings.

Data Configuration

Select the row in the table can let you edit the properties in this part.

- 1) Upload ROI: If checked "Yes", the ROI column of this row will be set to Ture(send); otherwise will set to False (not send).
- 2) Data Type: This data type denotes to the data user wants to send.
- 3) Description: The additional description of this data item.
- 4) Page: The page of this item.

After all the setting are completed, press "Modify and Save" to store the settings.

Update Multiple ROI

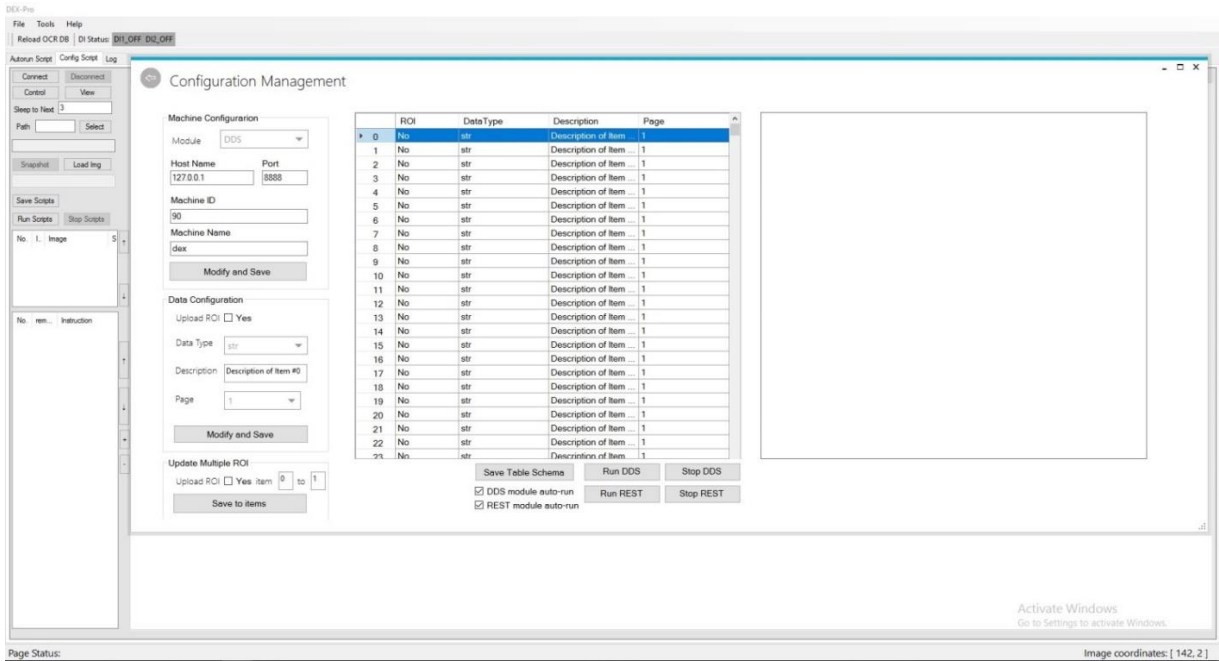
This magic sugar is designed for user to multi-select the upload ROI item.

- 1) Upload ROI: If checked "Yes", the ROI column of this row will be set to Ture(send); otherwise will set to False (not send).
- 2) item: this index let you group changing the property of Upload ROI.

After all the setting are completed, press "Save to items".

Run DDS/Stop DDS let you start or stop the DDS program locally. Same as REST, Run REST/Stop REST let you start or stop the REST program locally. The two check box, DDS module auto-run and REST module auto-run, let the DDS and REST can automatically locally start when DEX-Pro started.

Table



- 1) **ROI:** You can select whether ROI index of result for posting and have to also mapping the ROI index used in the script file editor.
- 2) **Data Type:** Define the ROI data type (uint string, or others)
- 3) **Description:** Define the description of ROI. SQL table schemas are created by this parameters. Description of Items must not be duplicated.

Click the “Save Table Schema button” (It will generate the config, xml for restful module)

```
<?xml version="1.0" encoding="UTF-8"?>
<DES>
  <TableSchema>
    <machine_id>2</machine_id>
    <length>5</length>
    <datatypes>u8,u8,u16,u32,str</datatypes>
    <descriptors>1Complete_PWB,2Attempted_Pickup,3Missed_Pickup_Errors,4TEST,5st</descriptors>
  </TableSchema>
</DES>
```

Then Open the restful module (Click the “Run REST module” button).

Finally run you script instruction to let the machine status data continuously.

In this RESTFUL module section for the post data function, you can find the general steps for machine status transmission.

If we editor the script file already. The Script file gives you options to configuration OCR data. Please check the instruction as following

Instruction Name: MSG SAVE TABLE TO LOG

Parameter:

- default X =0
- H = 1 (Machine status will post to edge-server by restful or DDS module)
- Text (For example: 1~7. Use this option to save the machine status data to array. The number indicate the index od ROI. It also save the log on local machine.
- Tool → Config → Config Management → DDS OCR Configuration

Scheduling instruction set

Show note

Instruction: MSG_SAVE_TABLE_T Note: select table to save

X	0	Note: 0: Save all items. 1: Save selected items
Y	0	Note: set table value to log Y = 0: default log
W	0	Note: W=1 : Save the Json log file(machinestatus), W=2 : Save the XML log file(machinestatus)
H	0	Note: H=1 : DDS module and RESTFUL module on
Q	0	

Text: 0 Select File Note: Save table Value (0;3;5...n or 0~n)

Sleep: 3 Waiting time between Instructions, this is the multiple of Time Stop

Back group: none Load Img

Remark: none Show Remark

Similarity: 1 Default is 1. In the blur of image distortion similar phenomenon, reducing this value can improve Identify accuracy

Multi-Character Format:

OK Cancel

Page identification

The page identify function can tag the target machine image by one or more pattern. The detail of description are described in section 6. The page configuration editor allows you to define the alarm code number for a specified alarm page. For a warning page, warning message and warning number can be defined. When VGA/DVI inputs are recognized with page id successfully, these page information will be extracted and uploaded to database.

Configuration Management

Page Configuration: Warning/Alarm

Update Rate (sec):

Set the Warning/Alarm update rate

	Type
▶ Page1	Normal
Page2	Normal
Page3	Normal
Page4	Normal
Page5	Normal
Page6	Normal
Page7	Normal
Page8	Normal
Page9	Normal
Page10	Normal

Update Rate (sec): The rate to upload warning/alarm information.

Set the Warning/Alarm update rate: save rate to config file.

FTP Management

Configuration Management

FTP Configurations

Server IP: Username: Password:

Apply

FTP Upload

Machine Status (OCR)
 Modbus Status
 Warning Message
 Alarm Message

Using an FTP client is a method to upload, download, and manage files on our server. Dex-pro provides ftp client functions, such as uploading files (logs). You will need the following FTP login details to access your FTP account through an FTP program:

- 1) **Server IP (host):** the FTP server IP
- 2) **Username/Password:** account & password to login FTP server
- 3) **Click the "Apply" button:** save the FTP username and password

4) **FTP Upload:** Select the log you want to upload (Machine Status/Warning Message/Alarm Message)

User Scenario

1. Using the instruction command "MSG_SAVE_TABLE_TO_LOG" then setting the jsonlog file.
2. Setting the "Machine Status (OCR)" enable.
3. The json file will upload to the FTP server. The server file default path is "home/machine id/" (Note1).

Note1: Use the Communication Module Configuration menu to set the Machine Configuration group box (include the machine id)

Note2: The local log file default log path are shown as following

- "C:\Program Files\ADLINK\Dex-100\main\Dex-100\LogJson\MachineStatusLog"
- "C:\Program Files\ADLINK\Dex-100\main\Dex-100\LogJson\WarningLog"
- "C:\Program Files\ADLINK\Dex-100\main\Dex-100\LogJson\AlarmLog"

Note3: The FTP client only uploads the json log file. (Xml does not support)

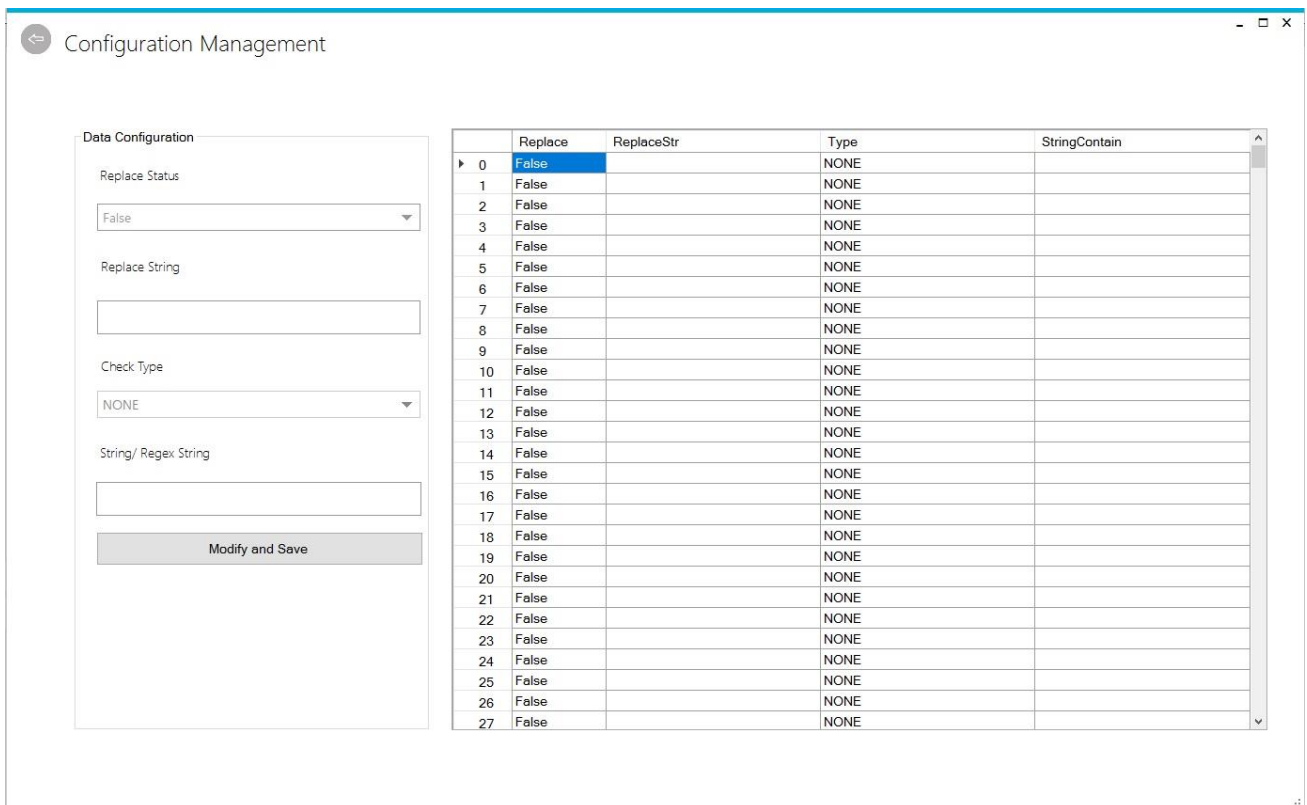
Data Filter

Tool → Configuration Management → Configuration Management → Data Filter

Main Program provide the Data Filter form for OCR data parsing/replace

Initial file: logXML.xml

```
<?xml version="1.0" standalone="yes"?>
<DES>
  <Filter>
    <Replace>False</Replace>
    <ReplaceStr />
    <Type>NONE</Type>
    <StringContain>1</StringContain>
  </Filter>
</DES>
```



Replace Status

you can choose whether to turn on the function (False or True) of replacing the string, or use Regex instead of the string. The following will briefly introduce the function of replacing the string.

Replace String

First, we can replace multiple strings (Enable the function: True or False)

Second, If the original data string is " Inspection: 2.0sec". Then the information we expect is the number "2.0".

E.g.: ROI item: Inspection: 2.0sec

- Set the replace status is "True".
- Set the Replace String is Inspection:,sec (**Note1**) then click "Modify and Save" button. The configuration are save in the XML file as following

<ReplaceStr>Inspection:,sec</ReplaceStr>

Note1:"," is the spilt char

The replace results are shown as following

Result: 2.0

If the replace function is error. It will return the "error" string

We can put the regex string to the <ReplaceStr>

E.g.: If we replace the ",","." Then we also can set the parameter [,] [.]

If we need to determine whether the result is correct, we can add the check type feature to determine whether it is a

string or a number. For example, the result of our replacement string is "2." (ocr recognition error)

Check Type

We can check the ocr results of data. If the ocr item is integer/double etc.

Then set the <Type> : NONE , InNumber , IsString. In this example we set the type is: "InNumber". However, the result will be judged that the value is not a legitimate number, so it will be returned 0.0

E.g.: ROI item : 2.x9 or df345\$x are non-illegal (Check Number: return 0.0)

E.g.: If ROI item is string (Ready/Running are also correctly). However, we can set the parameter on <StringContain> = Ready|Running

We can use the more advanced string comparison function to determine whether the string meets our expectations

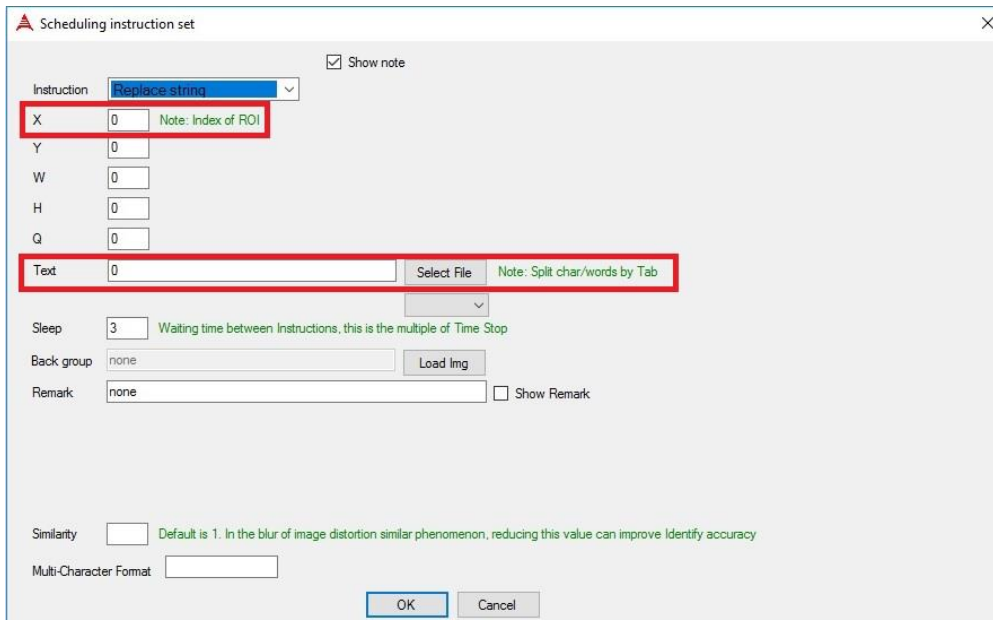
String/Regex String

It can accept the regex string.

E.g.: If we want to check the string are illegal or not. Expected result format is "5205310-A01-B" (seven numbers – alphabet two numbers – alphabet)

, we can set the parameter to be REGEX string: `“^[\\d]{7}-[A-Z]{1}[\\d]{2}-[A-Z]{1}&”`

However, we can also using the filter instruction



Filter data by string or regex string

If the text string less than 1: replace the string empty

The Text string are split by "TAB"

Ex: x=1 , Text: sec

It will replace the string "sec" to "" string empty

Modbus configuration

Main Program support I/O operations on connected Modbus devices. We can set Modus devices and I/O commands in the configuration pages.

Set Devices	Set the Modbus TCP/RTU device for the connection
Set Commands	Set the Command for the script editor using

[Set Devices]

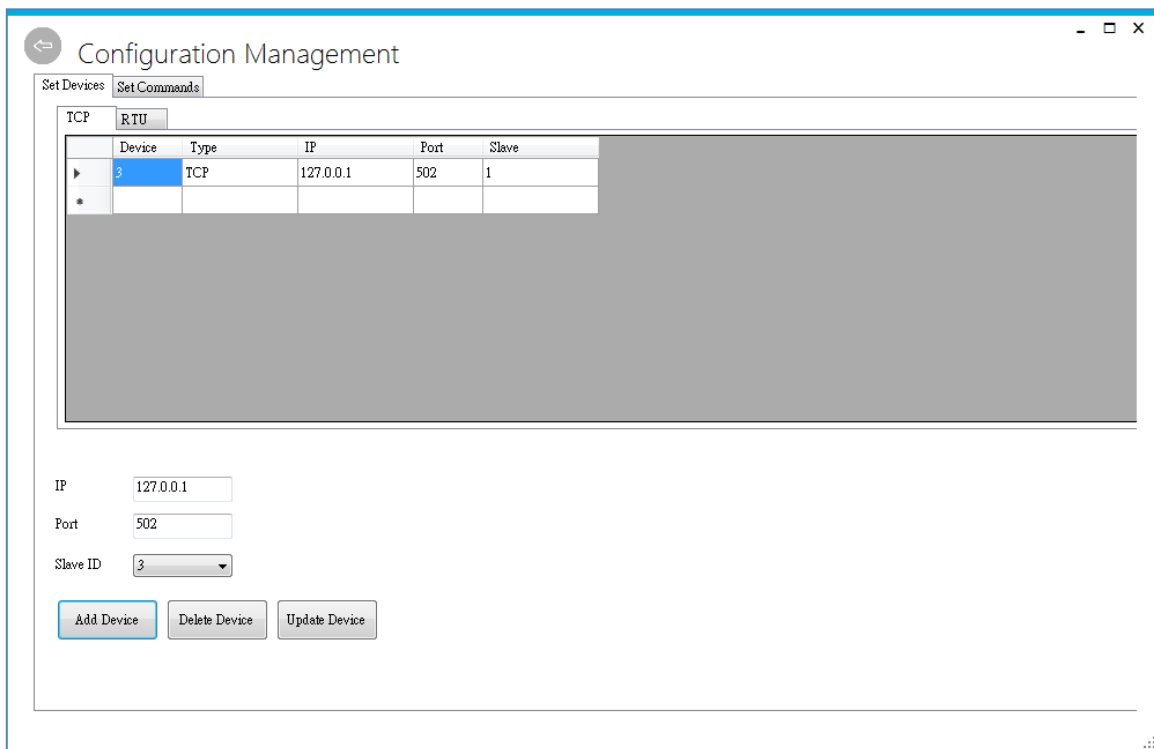


Fig 3.1.Set Device (TCP)

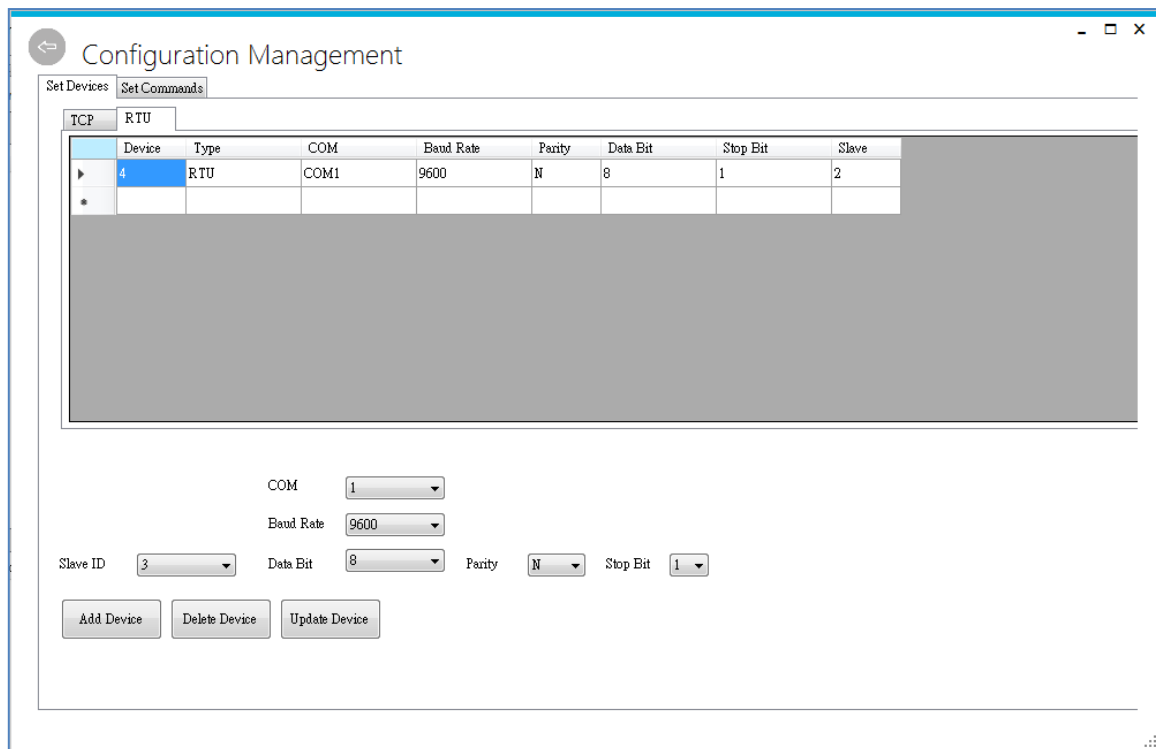


Fig 3.2.Set Device (RTU)

The modbus configuration provides the “Add Device”, “Delete Device” and “Update Device”.

- 1) Add Device: Add the modbus configuration mapping to real modbus device
- 2) Delete Device: Delete the modbus configuration which it may be invalid
- 3) Update Device: Update the modbus configuration for single device information

We explain what modbus information you need as follows:

- **TCP Device**

IP: IP address of the device

Port: Port number of the device

Slave ID: A unique device id to identify the device

- **RTU Device**

COM: COM port number of the device

Baud Rate: Baud rate of the device

Data bit: the data bit of the device

Parity: the parity of the device

Stop bit: the stop bit of the device. **Note: stop bit has to be 2.**

Slave ID: A unique device id to identify the device

[Set Commands]

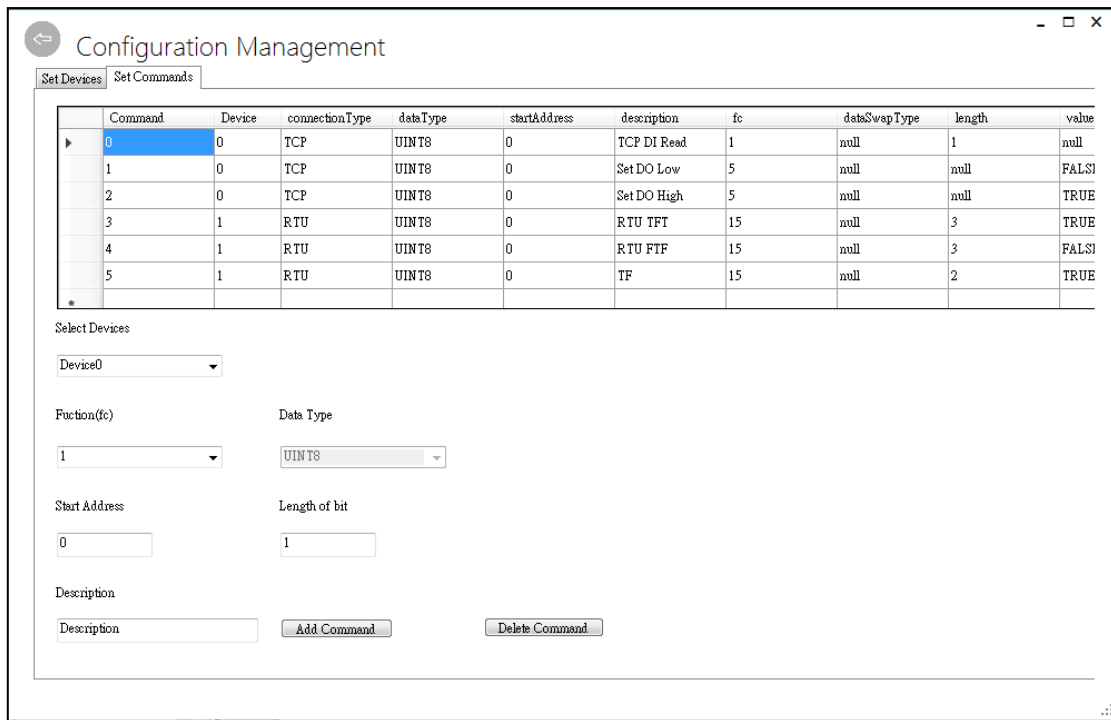


Fig 3.3.Set Commands

In the Command setting page, we need to choose a target device by specifying device id and Modbus function code and related arguments. We support function code 1, 2, 3, 4, 5, 6,15,16.

FC 1,2,3,4 are reading function, only set the "Data Type", "Start Address", "Length" and "Description"

FC 5,6,15,16 are writing function, set the "Data Type", "Start Address", "Length" and "Description" to define the Command, and input the writing value in Script Editor

We explain what command information you need as follows:

- 1) **Select Devices:** select what device you need to get/set value
- 2) **Function(FC):** Provide FC1,2,3,4,5,6,15,16
 - FC1: Read Coil Status (Read Bits)
 - FC2: Read Input Status (Read Input Bits)
 - FC3: Read Holding Registers (Read Registers)
 - FC4: Read Input Registers
 - FC5: Force Single Coil (Write Single Bit)
 - FC6: Preset Single Register (Write Single Register)
 - FC15: Force Multiple Coils (Write Multiple Bits)
 - FC16: Preset Multiple Registers (Write Multiple Registers)
- 3) **Data Type:** Provide the 5 data types
 - UINT8: Single Bit Value
 - UINT16: Single Register Value (16bit positive integer)
 - UINT32: Double Register Value (32bit positive integer)

- INT16: Single Register Value supported negative value (15 bit positive/negative integer)
 - INT32: Double Register Value supported negative value (31 bit positive/negative integer)
 - FLOAT32: Single Double Precise Value
- 4) **Start Address:** Read/Write value from the first address
- 5) **Length:**
- FC1,2,15 number of bits
 - FC3,4,16 number of registers (UINT16/INT16) or double-registers (UINT32/INT32/FLOAT32)
- 6) **Description:** describe the content for this command, for example, light switch (ON/OFF)

Fig. 3.3 shows a command with function code 1, reading ON/OFF status starting from address 0 for 1 bit of length. Fig. 3.4 shows how to edit script and Fig. 3.5 shows edit a command with function code 15, writing ON/OFF status starting from address 0 for 5 bit of length.

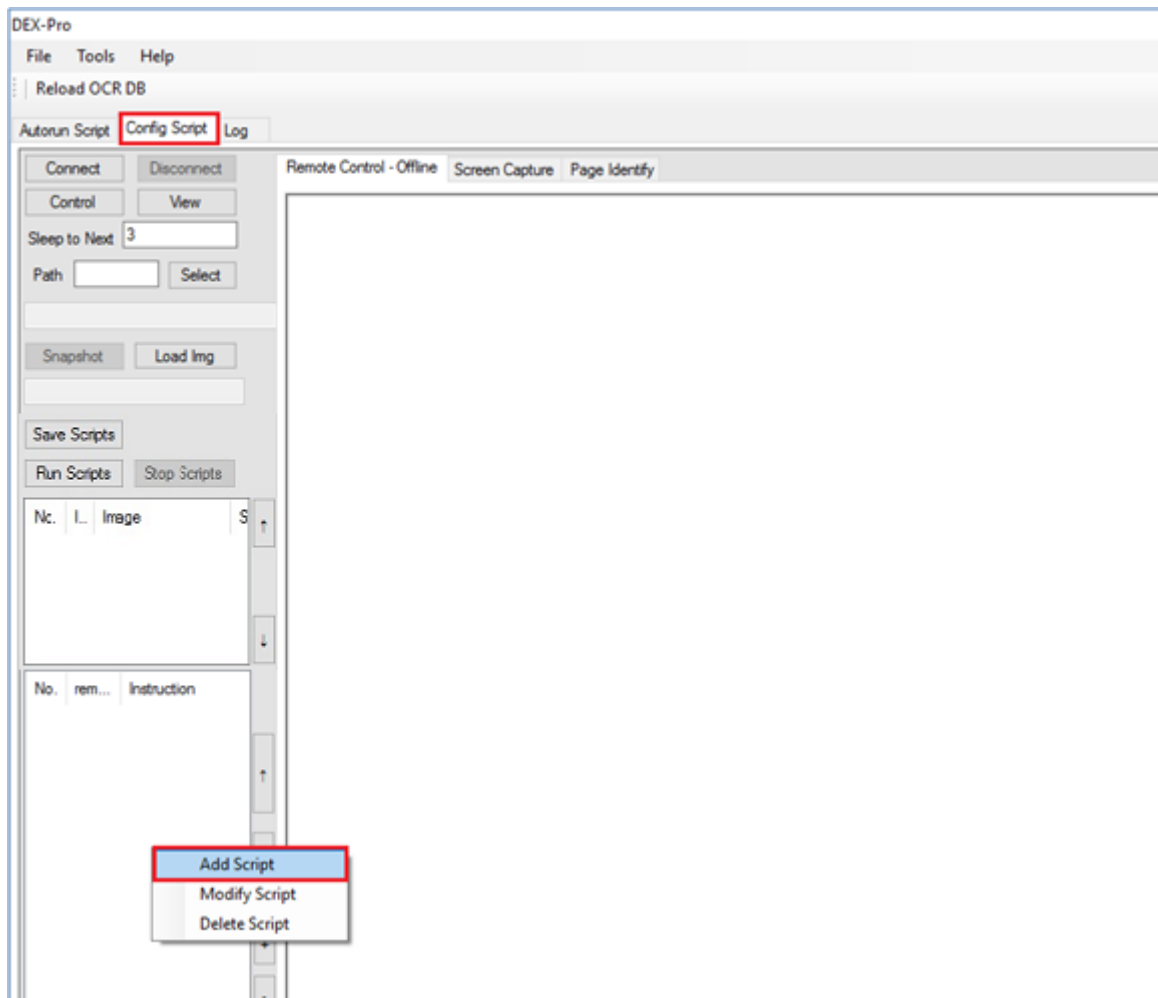


Fig 3.4.Edit script

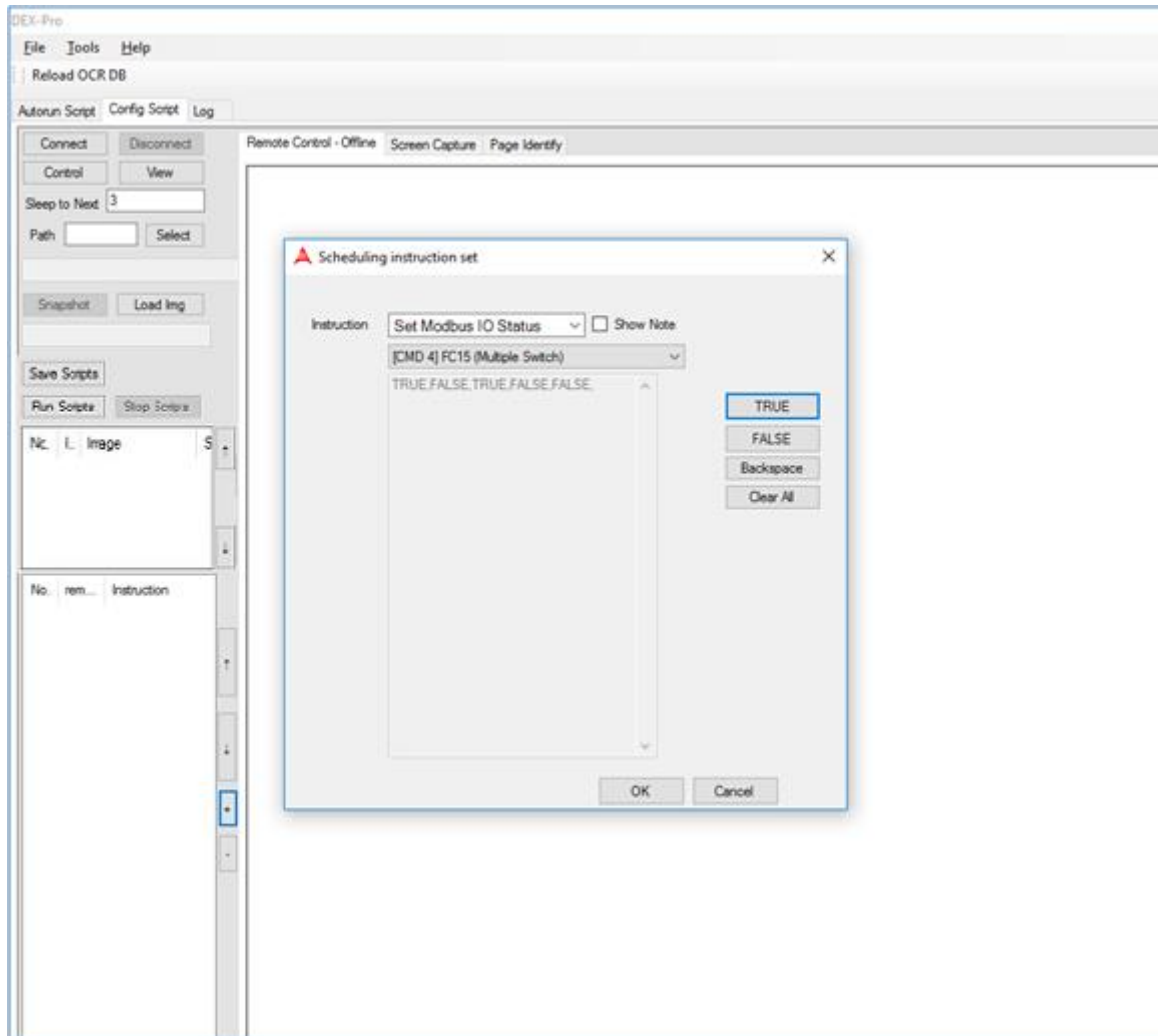
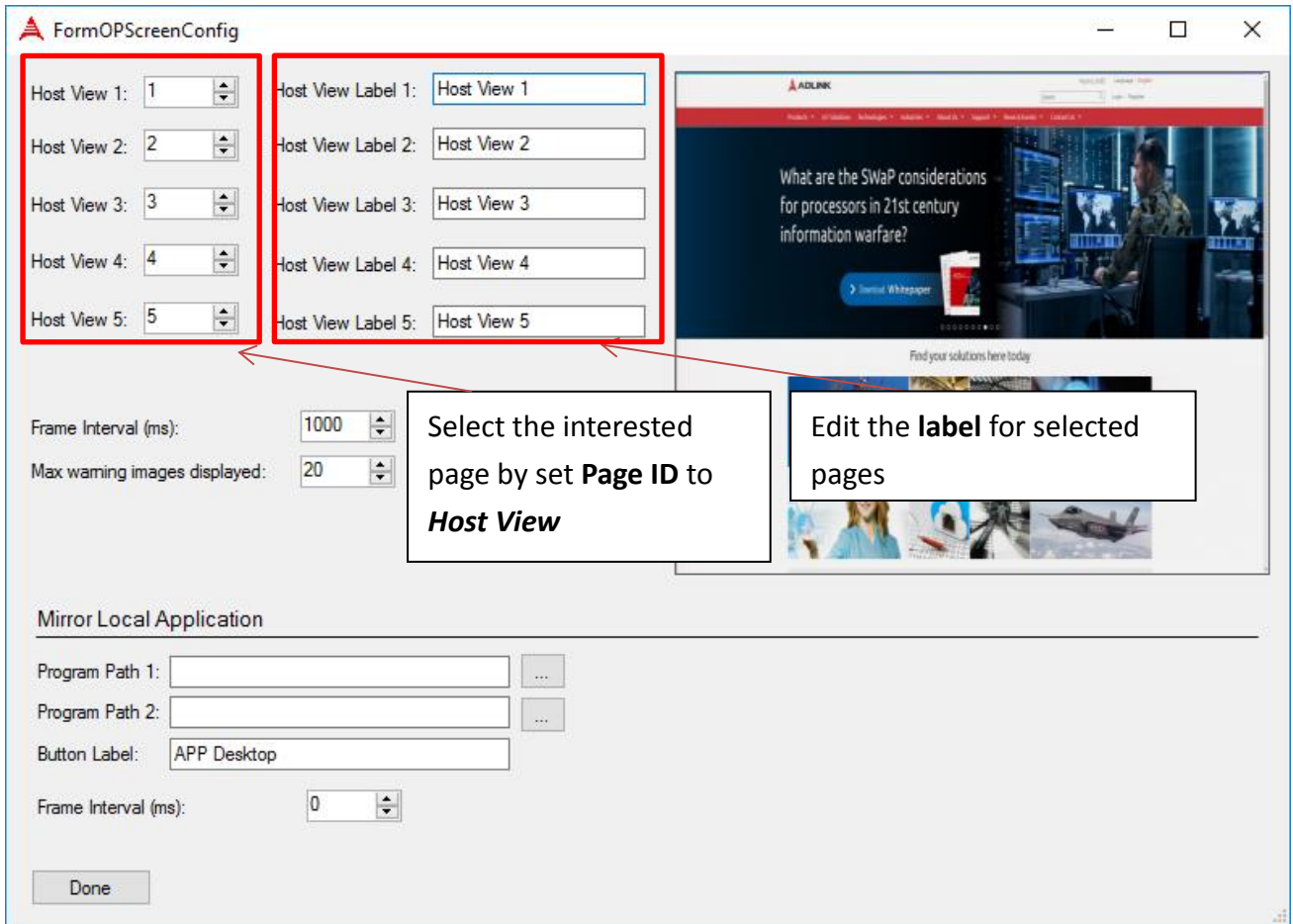


Fig 3.5. Writing Command on Script Editor

OP Screen Setting

Tools → Config → OP Screen Setting.

In OP Screen setting including a selection of interested pages displayed on OP Screen and its label. We can select at most five interested pages to be displayed on OP Screen in runtime mode. The Page ID can be assigned in the top-left area of the setting panel. The label also can be edited and displayed on OP screen.



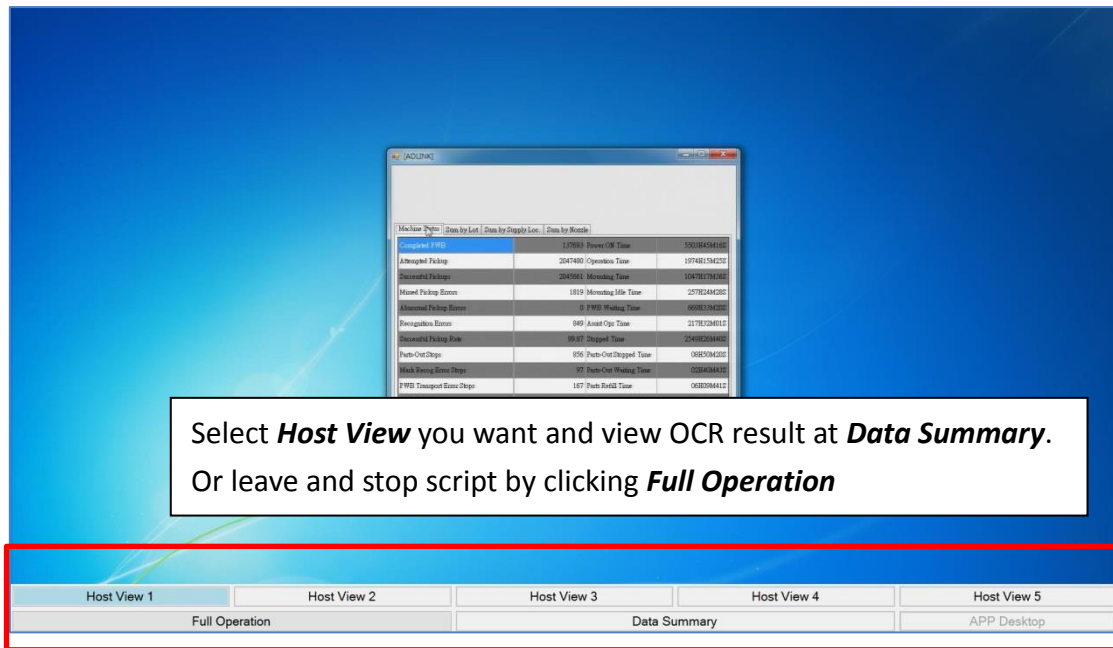
1) **Frame Interval (ms):**

Time period to sleep between output frames to OP-Screen.

2) **Max warning images displayed:**

In order to avoid warning / alarm pop out windows too many, you can set the maximum number of overlapping windows in the op screen. The maximum number of warning images can be displayed on OP-Screen. The detail of pop out windows setting are shown in section 7.5.

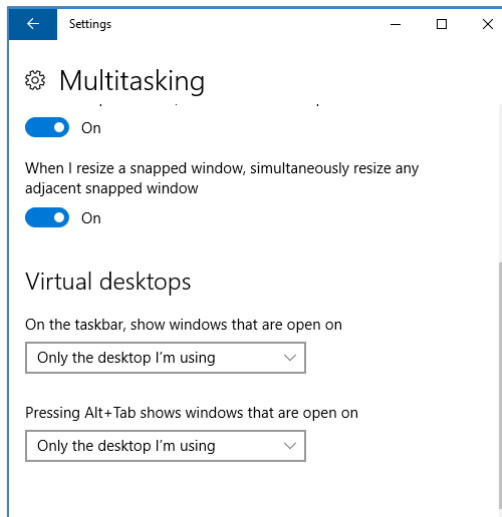
In runtime mode, the op screen will show the interested pages.



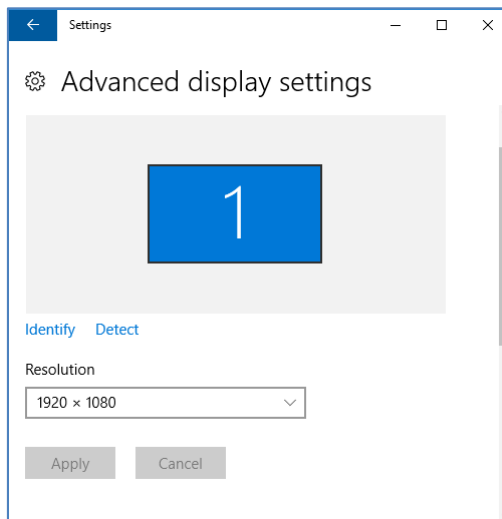
OP Screen Local Mode

Local Mode allows users to view and edit local applications (at most two) with OP-Screen. When Local Mode is entered, selected applications will be run in virtual desktop environment and users can operate them within the environment.

- **Switch to APP Desktop by receiving MSMQ message “SwitchMirrorDesktop”:**
“SwitchMirrorDesktop” is a DEX100 MSMQ message reserved keyword. If DEX100 receives the MSMQ command and enable local mode, it will switch to APP Desktop in the OP mode. For more DEX100 MSMQ message management information, please refer the topic “MSMQ Execute Script Management” in this chapter.
- **Configuration:**
 - a) Windows: Settings → Multitasking → Virtual desktops
Set options “On the taskbar, show windows that are open on” and “Pressing Alt+Tab” shows windows that are open on” to “Only the desktop I’m using”.



b) Set Dex-100 Screen Resolution the same as target Host machine.



c) Dex-Pro: Tools → Config → OP Screen Setting → Mirror Local Application

FormOPScreenConfig

Host View 1: 0 Host View Label 1: Host View 1

Host View 2: 0 Host View Label 2: Host View 2

Host View 3: 0 Host View Label 3: Host View 3

Host View 4: 0 Host View Label 4: Host View 4

Host View 5: 0 Host View Label 5: Host View 5

Frame Interval (ms): 2000

Max warning images displayed: 20

Mirror Local Application

Program Path 1: C:\Windows\system32\notepad.exe

Program Path 2:

Button Label: Notepad

Frame Interval (ms): 2000

Done

Fail to Load:

- **Process Path 1:** Full path for application 1 to be operated.
- **Process Path 2:** Full path for application 2 to be operated.
- **Button Label:** The text of button for Local Mode.
- **Frame Interval (ms):** Interval between frames for Local Mode.

d) Modify script instruction, setting Q=2 in Connect to enable Local Mode.

Scheduling instruction set

Show note

Instruction: Connect

X: 0

Y: 0

W: 1 Note: Frame numbers to skip in multipage mode

H: 1 Note: Page Mode: non-Pageld:0, Multi-page(pageid on):1, One-page(pageid on):2, Auto(recommend):3

Q: 2 Note: 0: OP off, 1: OP on, 2: Local Mode on

Text: 0 Select File

Sleep: 3 Waiting time between Instructions, this is the multiple of Time Stop

Back group: none Load Img

Remark: none Show Remark

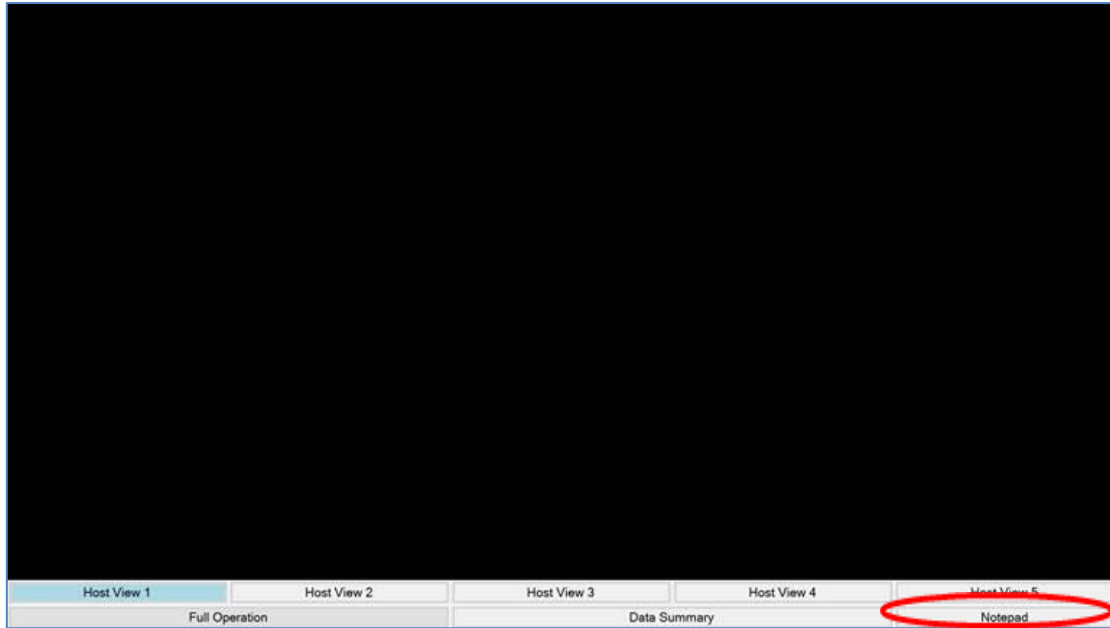
Similarity: Default is 1. In the blur of image distortion similar phenomenon, reducing this value can improve Identify accuracy

Multi-Character Format:

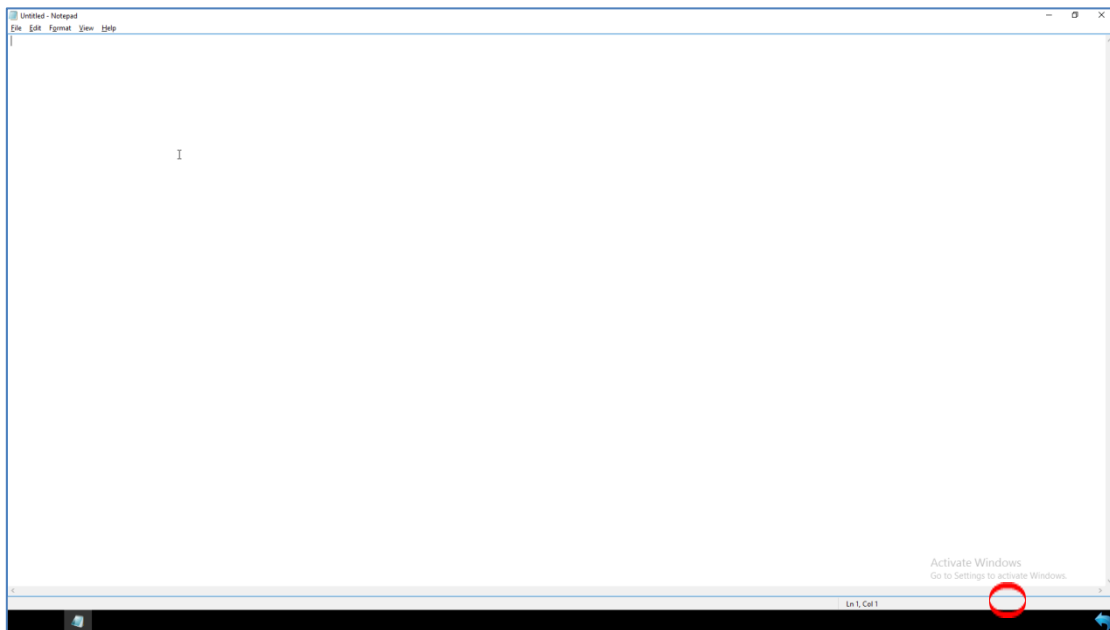
OK Cancel

Usage:

a) Enter Local Mode: Click bottom-right button on OP-Screen panel (e.g., Notepad)



- b) Local Mode: the virtual desktop operation environment will be displayed. User can click Return Icon located in right-bottom (or F12) to exit Local Mode.

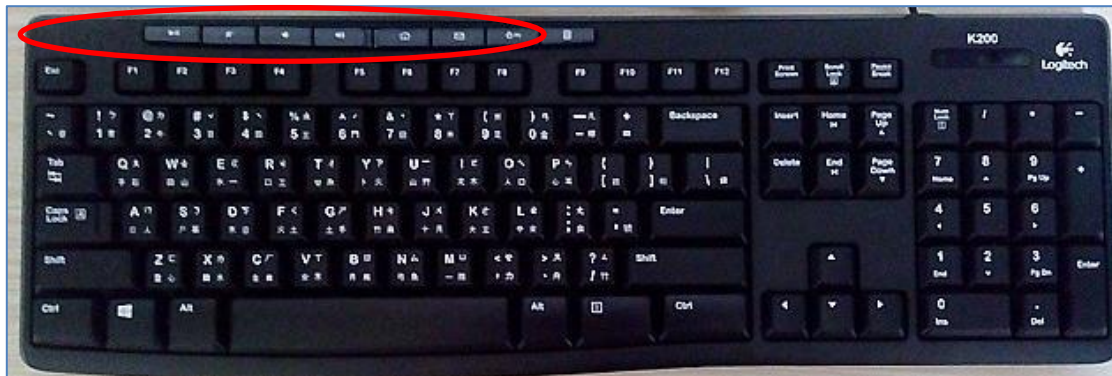


Note

- a) To avoid impacts on Dex-100 system, the following keys and combinations are disabled in Local Mode:
Win Key, F1-F10, PAUSE(BREAK), CTRL+ALT+DELETE, CTRL+ESC, CTRL+SHIFT+ESC.
- b) To avoid impacts on Dex-100 system, desktop icons, Windows Start Menu and system tray are hidden automatically when Local Mode entered. Manually setting is required to keep NO applications pinned to taskbar and turn off

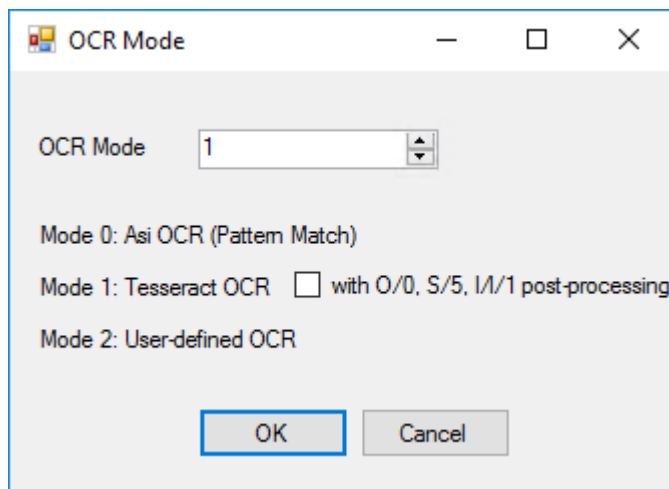
Cortana, People buttons and etc.

- c) Hot-Key for click OP panel buttons
F11: Full Operation, switch to full control mode.
F12: Return Icon, switch to OP panel.
- d) Do NOT use keyboards with special hot-keys.



OCR Mode Setting

User can set the OCR mode to either Asi-OCR or Tesseract. See more detail in 6.9.



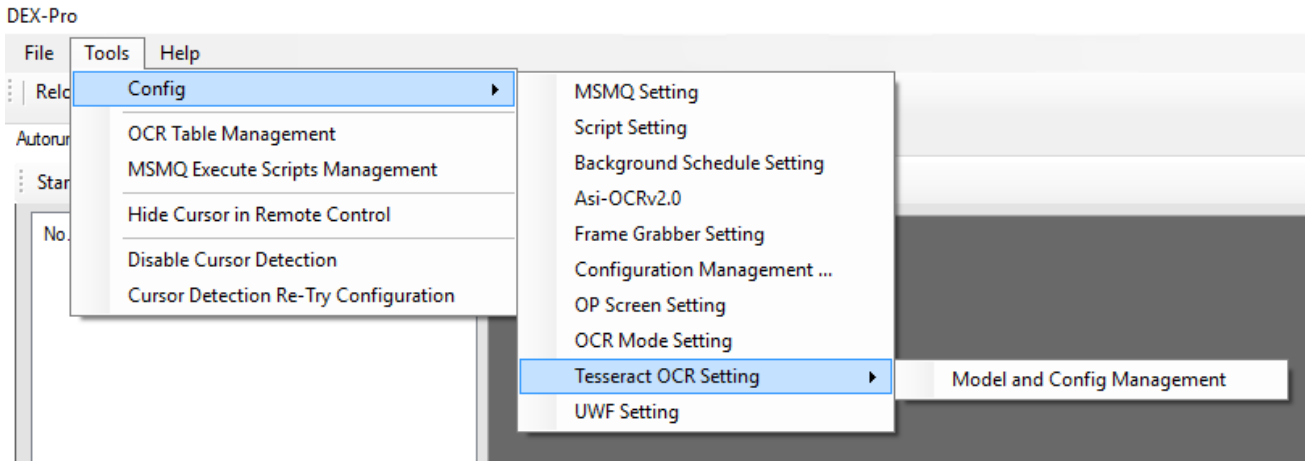
OCR Mode = 0 : using Asi-OCR

OCR Mode = 1 : using Tesseract

(with O/O post processing improve the O and 0 recognition, but it has to trained the O and 0 picture first)

OCR Mode = 2 : using User-defined OCR

If the OCR Mode using Tesseract, there will show additional detail settings "Tesseract OCR Setting->Model and Config Management". See more detail in 6.9.

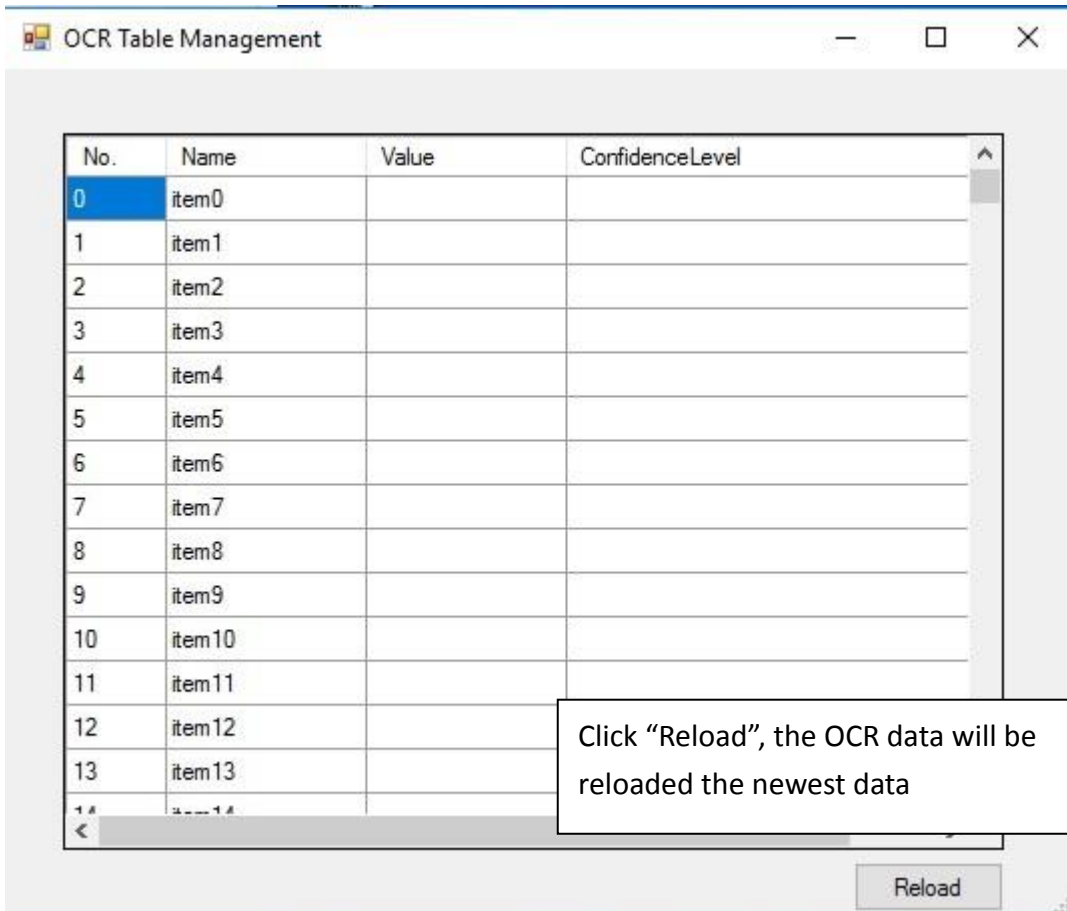


UWF Setting

UWF related setting. More detail can see in section 7.8.

OCR table management

This function lists the value for whole OCR table.



MSMQ Execute Script Management

Script mapping the command

Provide MSMQ Script Management

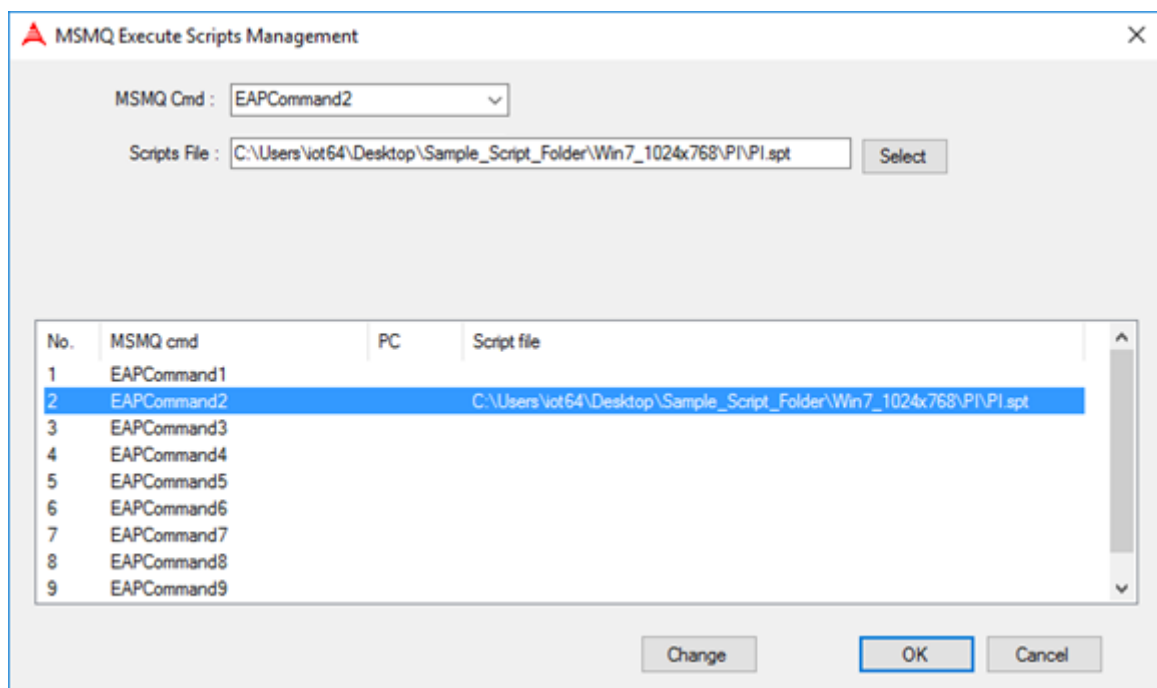
- One message mapping the one script
- We can insert the data by using the "key in" instruction
- MSMQ message reserved keyword:

- "SwitchMirrorDesktop"

Please refer the topic "OP Screen Local Mode" in this chapter. You can redefine the action by yourself here, but it is not recommended

- "EAPStopCommand"

This command can stop the running script that is called by MSMQ or autorun.

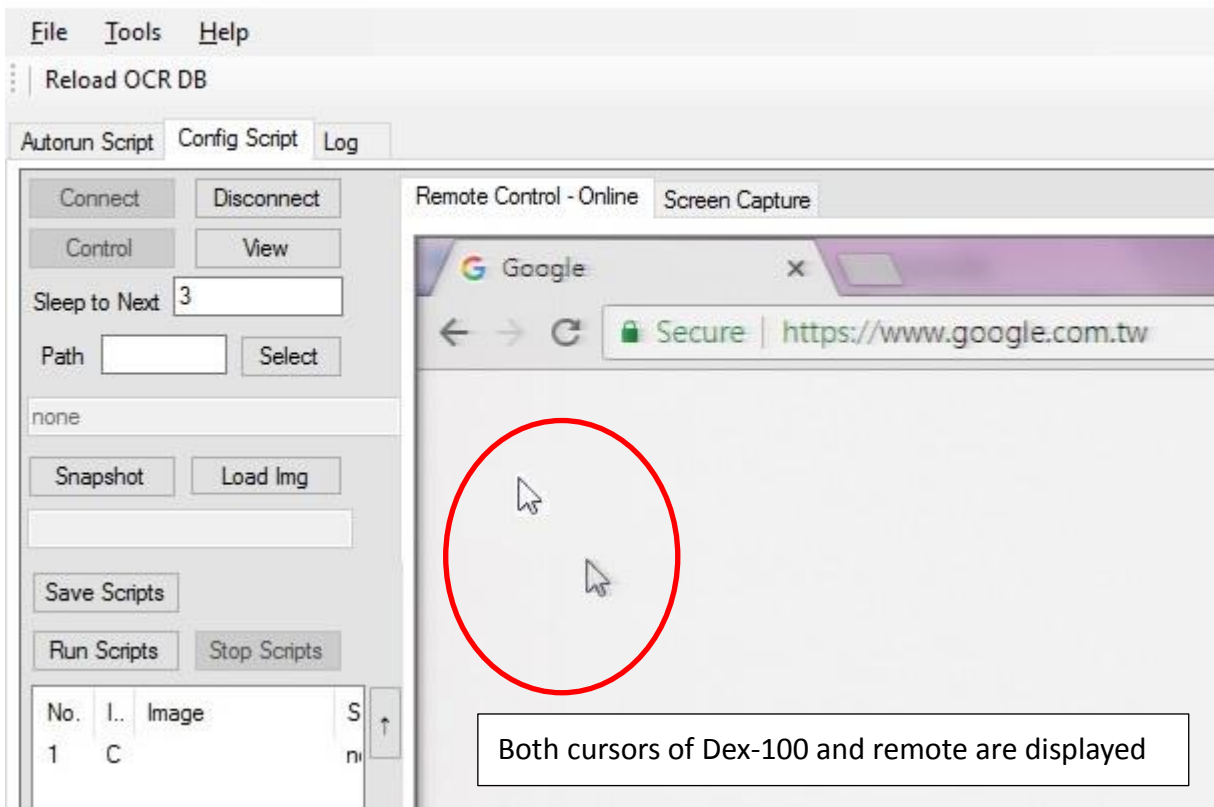


- 1) **MSMQ Cmd:** Select MSMQ instruction.
- 2) **Control PC:** Choose a connected extractor.
- 3) **Scripts File:** Schedule to be collocated.
- 4) **Change:** Save the modified changes.
- 5) **OK:** Save editing settings, please restart the program, the profile will be re-loaded to complete the set.

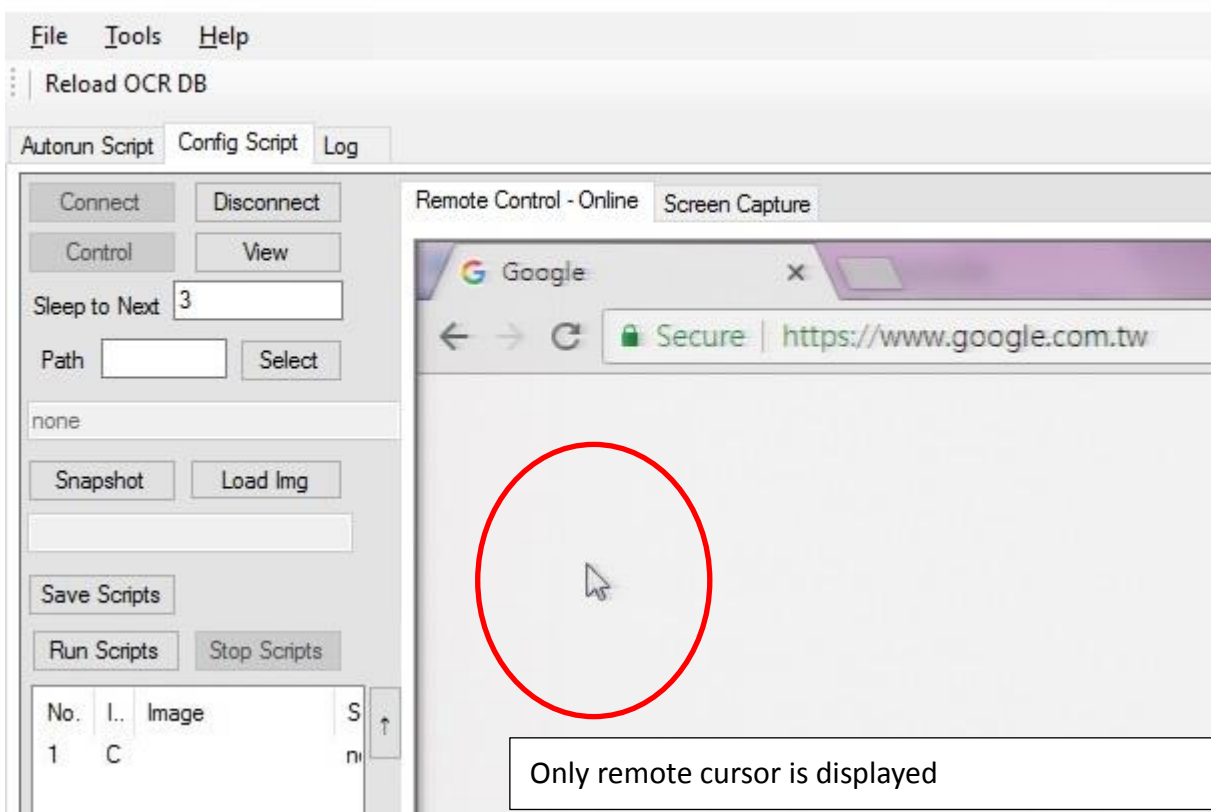
Hide Cursor in Remote Control Panel

In remote control panel, you can control remote machine cursor with DEX-100 mouse. The remote cursor will move the position where Dex-100 cursor located, and both cursors will be displayed, shown as the figure below. When "Hide Cursor in Remote Control Panel" is enabled, only remote cursor will be displayed, as the next figure below.

DEX-Pro



DEX-Pro



Disable Cursor Detection

This function is global setting for cursor detection enable/disable. If your mouse command already set cursor detection enable, we provide the global setting to disable the cursor detection. E.g. Left click: the W parameter is set 1 and Right click: the W parameter is set 1, too. We can check "Disable Cursor Detection", and the cursor detection function is ignored. Otherwise, if we uncheck "Disable Cursor Detection", the system will follow the command scope setting to operate. It is showed as follows.

Scheduling instruction set ✕

Show note

Instruction: **Left click** ▼

X: 500 Note: Cursor coordinates x

Y: 500 Note: Cursor coordinates y

W: **1** Note: Cursor Detection Enable. 1:Enable, Default is disable

H: 100

Q: 90

Text: 0 Select File

Sleep: 3 Waiting time between Instructions, this is the multiple of Time Stop

Back group: none Load Img

Remark: none Show Remark

Unique cfg: none Set cfg

Similarity: Default is 1. In the blur of image distortion similar phenomenon, reducing this value can improve Identify accuracy

Multi-Character Format:

OK Cancel

Enable this "Left click" command to cursor

Scheduling instruction set ✕

Show note

Instruction: **Right click** ▼

X: 300 Note: Cursor coordinates x

Y: 300 Note: Cursor coordinates y

W: **1** Note: Cursor Detection Enable. 1:Enable, Default is disable

H: 100

Q: 90

Text: 0 Select File

Sleep: 3 Waiting time between Instructions, this is the multiple of Time Stop

Back group: none Load Img

Remark: none Show Remark

Unique cfg: none Set cfg

Similarity: Default is 1. In the blur of image distortion similar phenomenon, reducing this value can improve Identify accuracy

Multi-Character Format:

OK Cancel

Enable this "Right click" command to cursor

DEX-Pro

File Tools Help

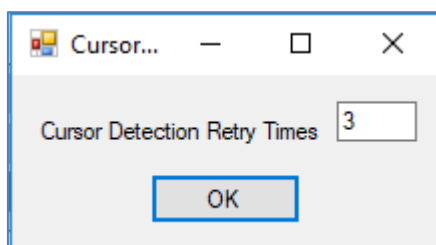
- Relo
- Autour
- Co
- Co
- Sleep
- Path

- Config
- OCR Table Management
- MSMQ Execute Scripts Management
- Hide Cursor in Remote Control
- Disable Cursor Detection**
- Cursor Detection Re-Try Configuration

Disable all commands cursor detection

Cursor Detection Re-Try Configuration

This function is setting the re-try times when cursor losing tracing happens. The re-try times represent the re-trace the machine cursor times. (The default value is 3) If it is over the re-try times and it is still not correct, it will show message box to alarm in DEX-Pro. It will happen on status 1, 2 and 7 showed table on Section 6.6.6.



3.1.3. Help menu

About DEX-Pro

Version information

This dialog contains detailed version information for the DEX-Pro itself as well as detailed version information for all referenced assemblies.



3.2. Quick Menu

3.2.1. Reload OCR DB (AsiOCR Only)

Reload OCR Txt DB from text file and Big Image File. Default text and big image will be templatefile.txt and TrainingData.bmp respectively. DB can be set in Asi-OCR config.

3.2.2. DI Status

Provide the DI1 and DI2 ON/OFF status.

3.3. Tab Menu

3.3.1. Auto-run Script panel

When the script is first started, it automatically detects any compliant trigger source. The script file will trigger by digital input (DIN2)/ hid time out/ msmq command.

Button	
Start (Auto):	Start script, set in background schedule setting.
Stop(Auto):	Stop script
Draw Image (On)	Display remote screen enable
Draw Image (Off).	Display remote screen disable

Running Script Panel

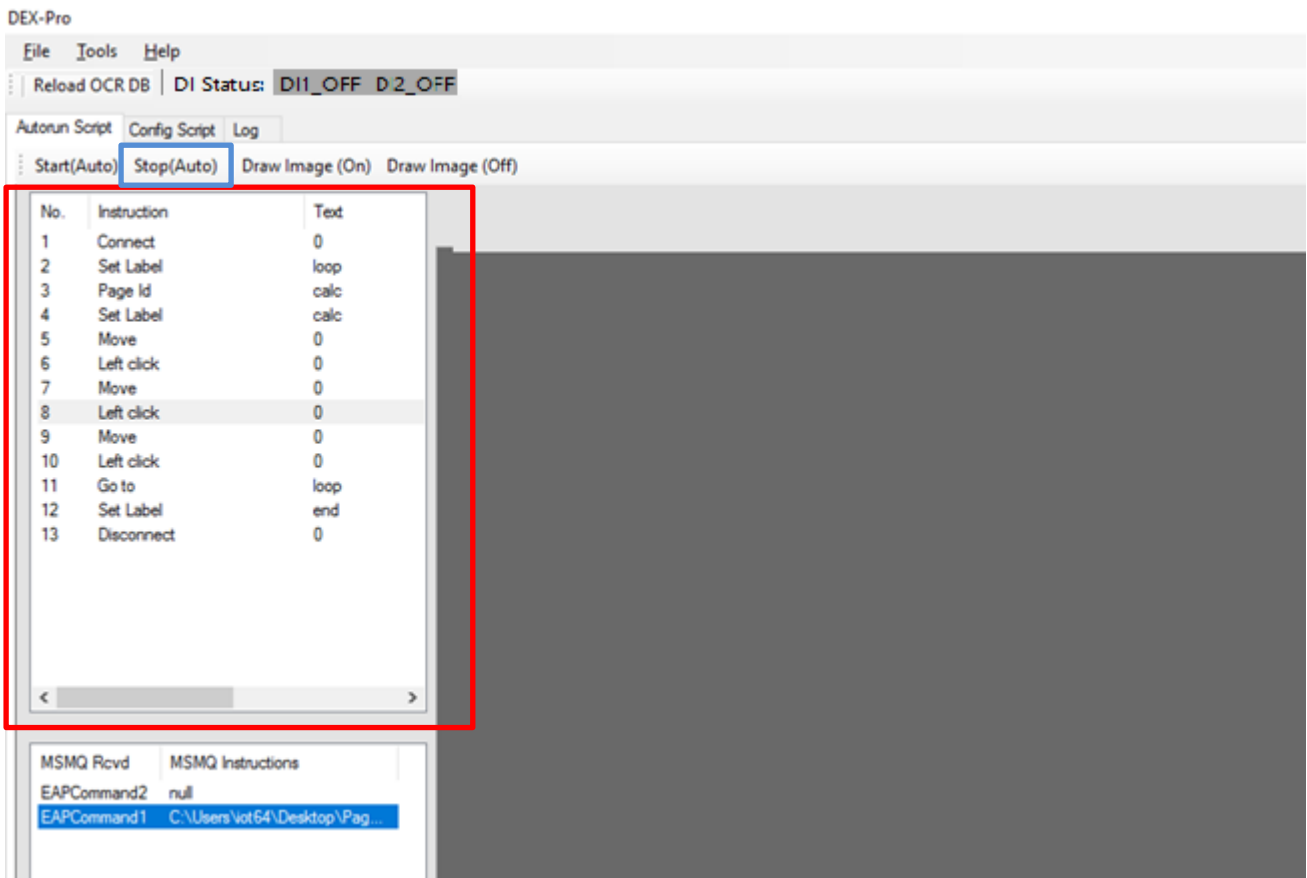


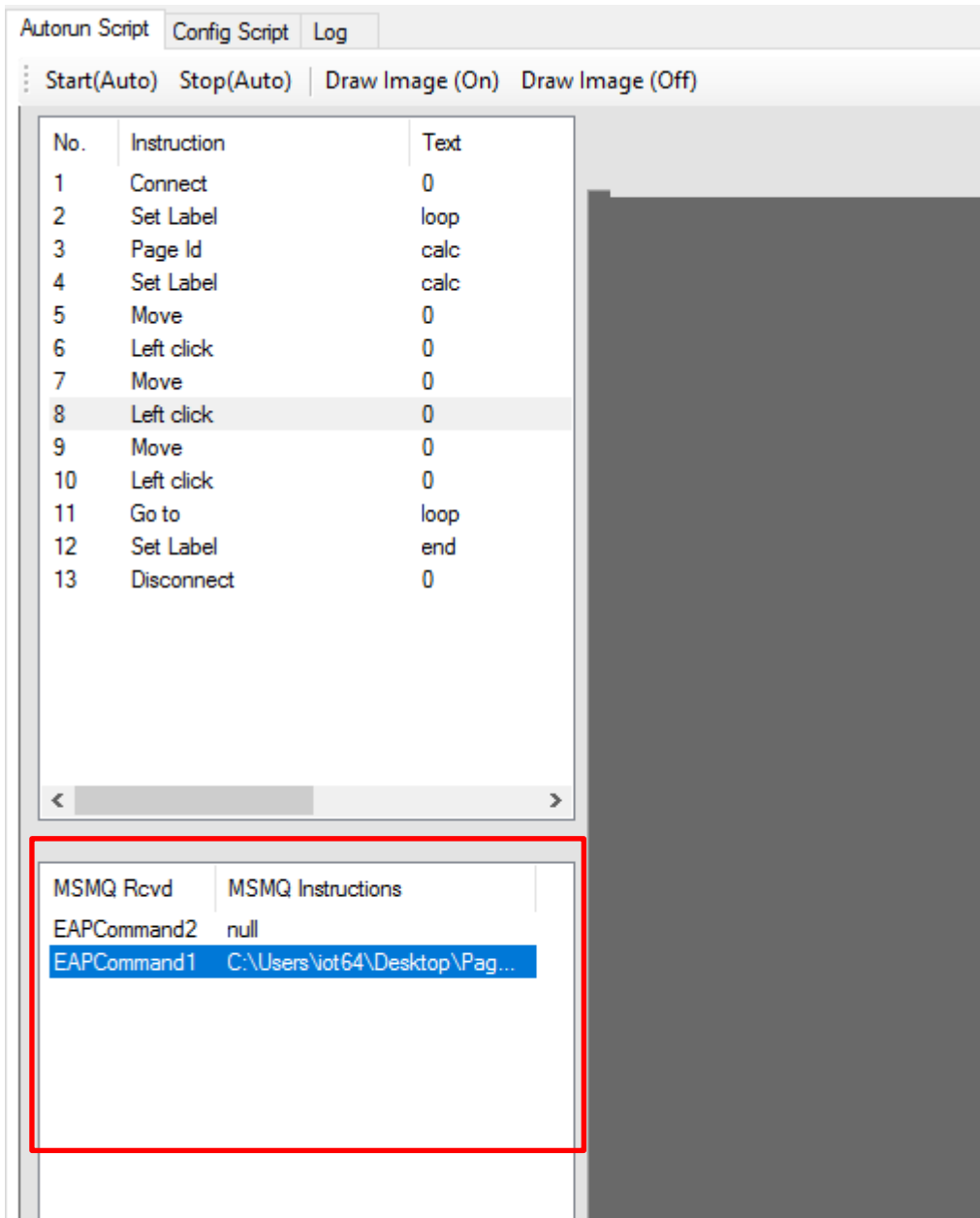
Fig3.2.2

When the schedule is executed, an action to execute the schedule will be displayed on this page.

At the beginning of the execution, the schedule edit page and the LOG page cannot be operated, and the Stop button (illustrated by blue rectangle in Fig3.2.2) is for stopping the automatic schedule. The top left buttons named end with “(Auto)” is to control the schedule, and the currently executing schedule will be highlighted.

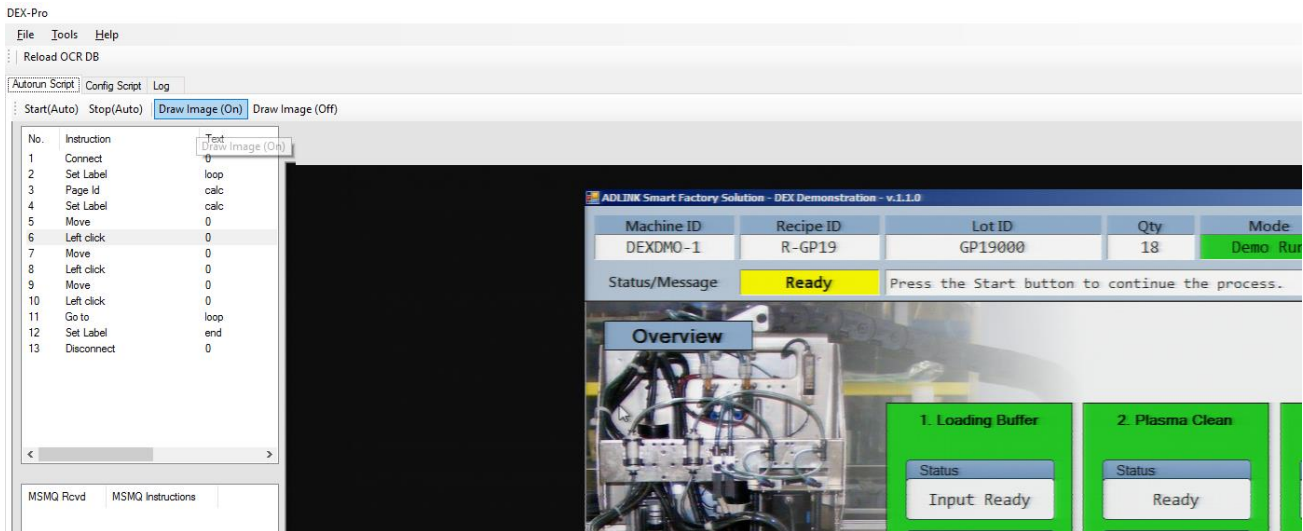
MSMQ Panel

When Dex-Pro receives a message from MSMQ, the received message and associated script will be displayed on the MSMQ panel. The panel can display up to 100 messages, more detailed will be stored in log file (“C:\Program Files\ADLINK\Dex-100\main\Dex-100\logs\logfile.txt”).



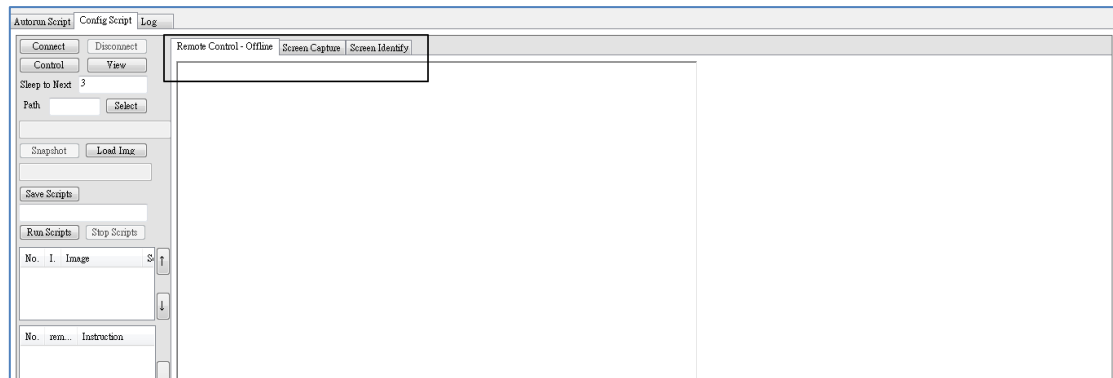
Running image panel

The right side of the remote computer's real-time image, you can see the page to control the operation when Draw Image is on.



3.3.2. Config Script panel

Remote Control Pane	Current target machine screen
Screen Capture Pane	Editor for OCR selection
Page Identify Pane	Editor for Page Identify



Remote Control panel

The basic functionality for the connect button is to be able to either capture image.

If acquisition has already been started then this button will wait for the next image from the grabber. The disconnect button will call the acquisition inside the grabber is stopped by executing the "AcquisitionStop" function.

Scenario Description

- If we want to control the target machine by mouse (Please click the "Control button")

If we need to be saved image to disk then select the “Snapshot” button. This will save the image getimg_001, getimg_002.....getimg_00N in the script file folder. (Path: Your script file folder)

Note: Need to click the “Select” button to select your folder or create new folder

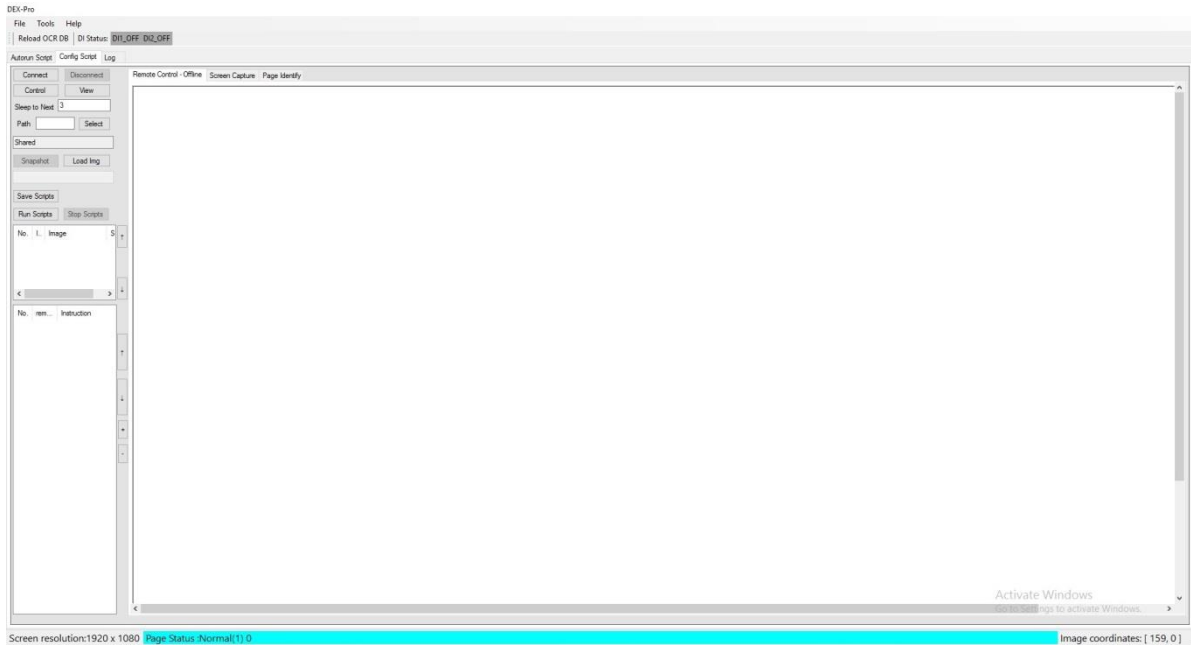


Fig 3.2.3

Screen Control panel

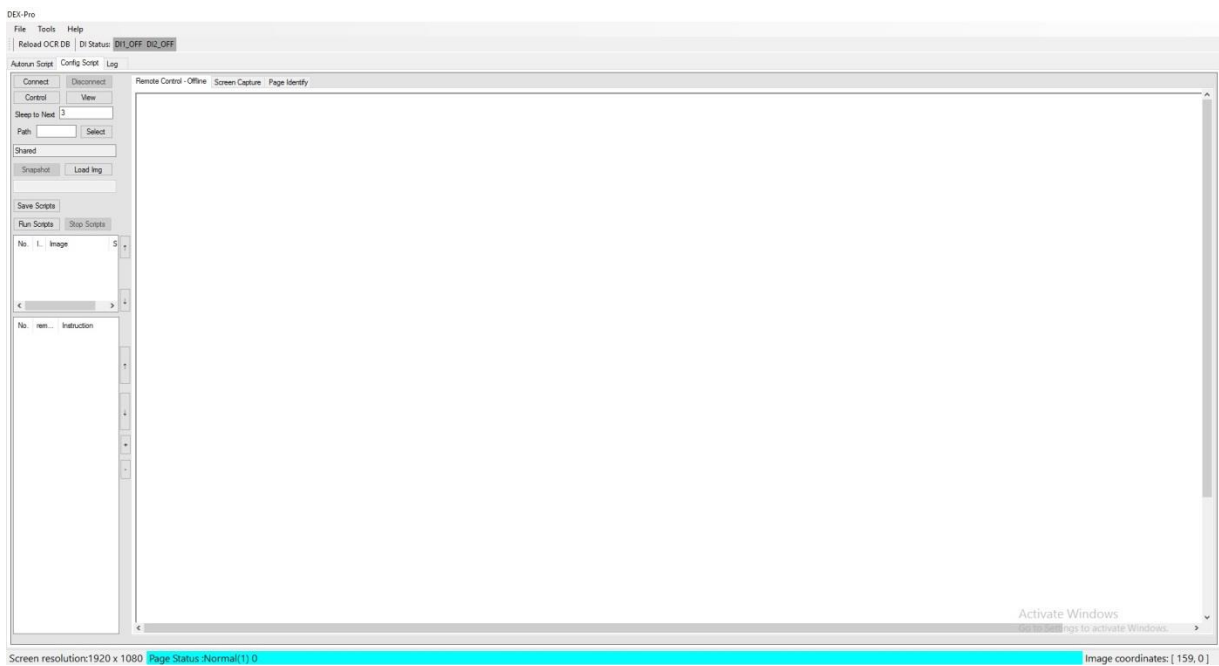


Fig 3.2.4 Script edit pane

In this screen to do the compilation and testing of the action, the following is the function of the key instructions:

Left side Pane

- 1) **Connect:** Equipment connection, the machine can see the picture on the right.
- 2) **Disconnect:** The device ends the connection.
- 3) **Control:** after connection, you can control the console.
- 4) **View:** after you are online, you cannot control the console; only view the screen of the machine.
- 5) **Sleep to Next:** set the wait time between directives
- 6) **Path:** Set the path to the storage disk case and use it when you need to go online to the computer.
- 7) **Snapshot:** after online, retrieve the screen of the machine, save as BMP file
- 8) **Load Img:** load picture, display to the right of picture
- 9) **Save Scripts:** Store the schedule in the current edit
- 10) **Run Scripts:** Use file → load File , Reading SPT after file, use this button to perform a schedule
- 11) **Stop Scripts:** Use this button to break execution scheduling when executing a schedule

After the click of the scheduling instruction, the order of the instructions can be modified by the

- Component of the upper and lower key.



Fig 3.2.5 Script Edit functional button

Click on the specified screen or schedule command: Press the up and down arrow keys to switch the order of commands / screens.

- In order to set the common instructions for scheduling, click to set the instructions to the scheduling

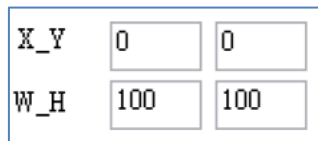


Fig 3.2.6 Absolute position for the mouse

When setting the mouse on the picture, the mouse click position (X_Y) or frame selection range (W_H) is displayed.

- To the right for editing the scheduling, commonly used functions:



Fig 3.2.7 KB and mouse functional button

Set the schedule of commonly used instructions:

Click to set the command to schedule

- OCR identified as text, the common follow-up approach:

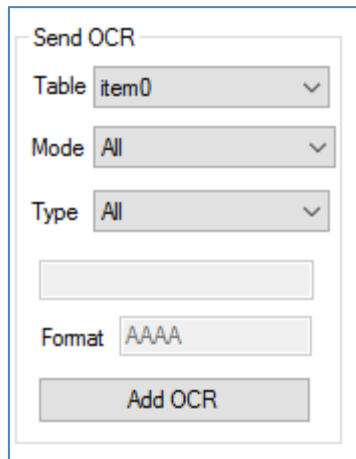


Fig 3.2.8 OCR Identification function pane

- OCR Identification directives:

Table field: When the point is selected to the identification picture instruction, the number of the identification frame is displayed.

Mode Identification mode: Select the identification mode is not All (the following figure) , the instruction needs to be compared to the text after the identification, the input is more than the text by pressing ADD OCR can set instructions to a schedule.

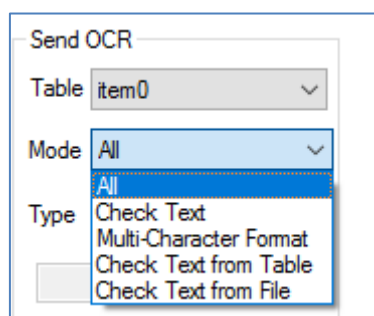


Fig 3.2.9 OCR Mode Selection

OCR Mode for the options are described below:

- 1) **All:** After the text is recognized, no literal alignment is performed. Multiple data can be identified at one time, the left mouse button box to select the range of identification, press ADD OCR. You can add instructions to the queue
- 2) **Check Text:** After identifying the text, make the text comparison. Enter the name of the text pair in the input

field above the Add OCR. After entering text, press add OCR to add instructions to the schedule

- 3) **Multi-Character Format:** Define character type for every character one by one in "Format".
- 4) **Check Text from Table:** Compare the identified text from ROI with Table item. Enter the item number in the textbox, press add OCR to add instructions to script. Instructions "Get bmp rect", "Send OCR" and "Table Compare" will be added to script.
- 5) **Check Text from File:** Compare the identified text from ROI with input from specified file. Enter the file path in the textbox, press add OCR to add instructions to script. Instructions "Get bmp rect", "Send OCR" and "Table Compare" will be added to script.

OCR Type: Select the type of OCR.

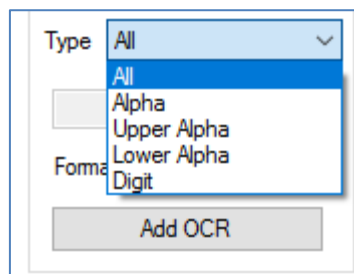


Fig 3.2.10 OCR Type Selection

- 1) **All:** normal ocr.
- 2) **Alpha:** The ROI will be recognized as alphabet text.
- 3) **Upper Alpha:** The ROI will be recognized as alphabet text with upper case.
- 4) **Lower Alpha:** The ROI will be recognized as alphabet text with lower case.
- 5) **Digit:** The ROI will be recognized as numbers.

Format: Define character type for every character one by one, and the character format type is as follow:

- 1) A: all
- 2) N: Number
- 3) L: Uppercase letter
- 4) l: Lowercase letter
- 5) W: Uppercase and Lowercase letter

- OCR Identification Test:

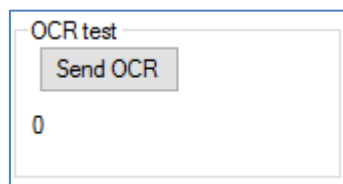


Fig 3.2.10 OCR Test

OCR Test provides a quick OCR identification for a selected ROI. Select ROI and press "Send OCR" than the OCR result

will be displayed. For example, the ROI was recognized as "0". OCR Type is able to be specified by selecting the type.

Page Identify panel

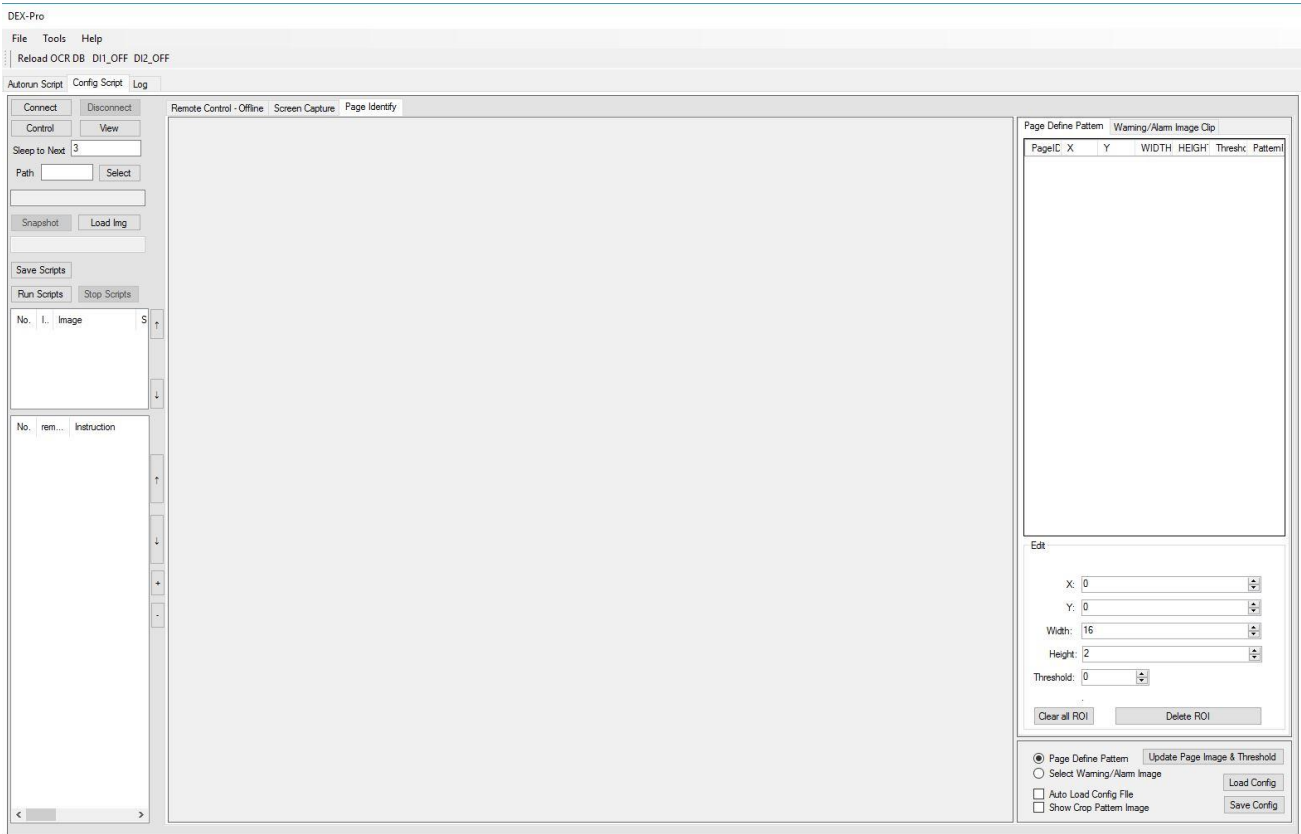


Fig 3.2.9 Page Identify Editor

The Page Identify Editor is for selecting and setting patterns to define page id and warning images.

- **Page Define Pattern**

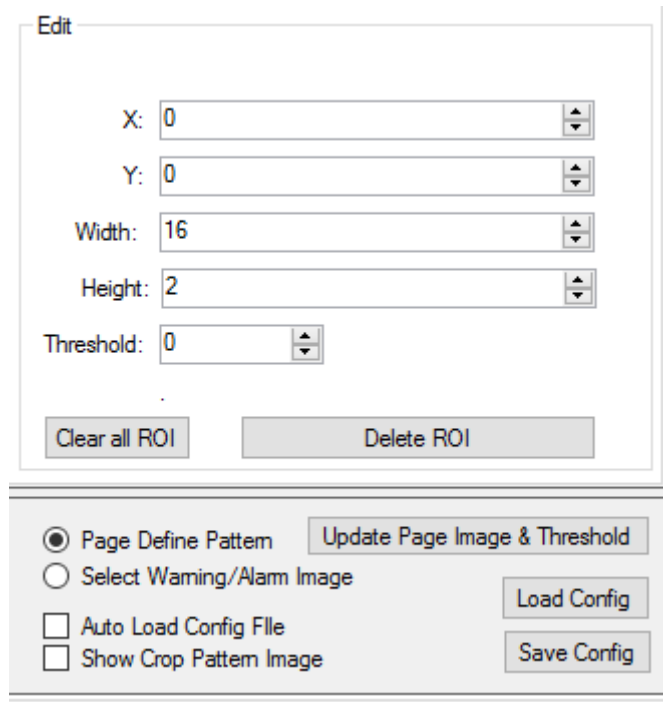


Fig 3.2.10 Page Identification panel

Edit

X: The selected pattern's x position, must be a multiple of 16.

Y: The selected pattern's y position, must be a multiple of 2.

Width: The selected pattern's width, must be a multiple of 16.

Height: The selected pattern's height, must be a multiple of 2.

Threshold: The threshold for selected pattern. Suggest Value: 100.

Clear all ROI: Remove all pattern.

Delete ROI: Remove selected pattern.

Page Define Pattern: When this item is checked, the dragged ROI is used as page-identify pattern.

Select Warning/Alarm Image: When this item is checked, the dragged ROI is used as a warning image.

Update Page Image & Threshold: Based on current target screen, re-calculate the comparison threshold of the page's pattern and save it.

Load Config: load page identify config file from the working Path.

Save Config: save page identify config in the working Path.

Auto Load Config File: Auto-load page identify config file when Dex-Pro main program is lunched.

Show Crop Pattern Image: Display the selected pattern.

- Warning/Alarm Image Clip

The image shows a control panel for setting warning or alarm image properties. It contains four vertical input fields, each with a numeric value of '0' and a small up/down arrow icon on the right side. The labels for these fields are 'X:', 'Y:', 'Width:', and 'Height:'. Below these fields is a rectangular button with the text 'Clear Warning/Alarm Image'.

Fig 3.2.10 Warning/Alarm image panel

X: The selected image's x position, must be a multiple of 16.

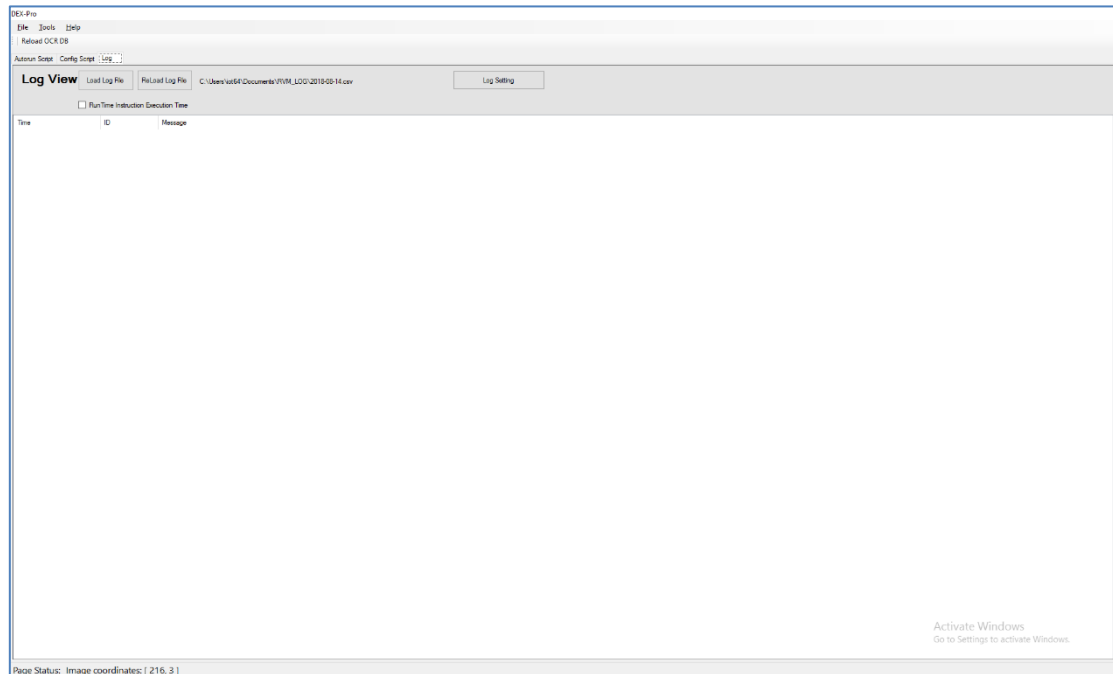
Y: The selected image's y position, must be a multiple of 2.

Width: The selected image's width, must be a multiple of 16.

Height: The selected image's height, must be a multiple of 2.

Clear Warning/Alarm Image: Remove selected Warning/Alarm Image.

3.3.3. Log panel



Record the operation of the action and MSMQ message delivery, Tools → Log Setting can be set to store the number of days, click Search Log File can look for the previous record.

Log function button

Load log file	Log execution and run time log
Reload Log file	Reload the run time log (by date)
Log Setting	Settings of Log

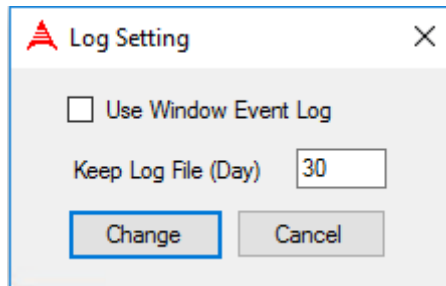
Log Setting

The log files keeping days

Path:

C:\Users\user\Documents\RCM_TABLE_LOG

C:\Users\user\Documents\RVM_LOG



1) Use Window Event Log:

Check the log stored in the system event book, if there is no check will save the text file on the folder.

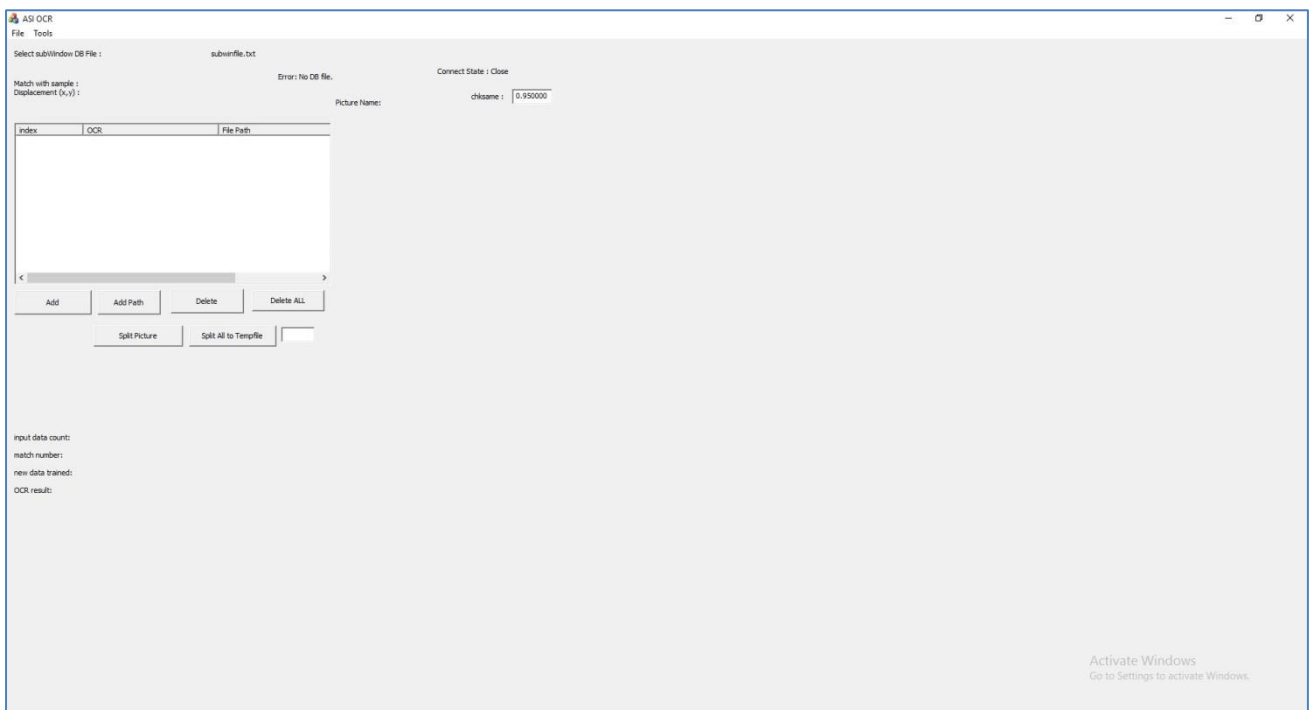
2) Keep Log File (Day):

Use Window Event Log is not ticked, that is saved as a text file, and can set the number of days to save.

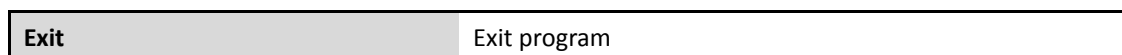
4. OCR Tool Workspace & Menus (AsiOCR only)

The OCR tool performs optical character recognition (OCR), a process that verifies the characters in one or more character strings match the characters you expect in each acquired image. When you test in OCR tool, you specify the number of strings you want to verify and the characters they should contain. The OCR tool path is in C:\Program Files\ADLINK\DEX-100\main.

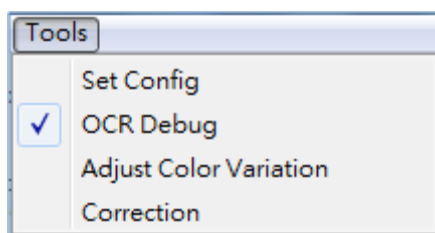
4.1. Menu bar



4.1.1. Files Menu

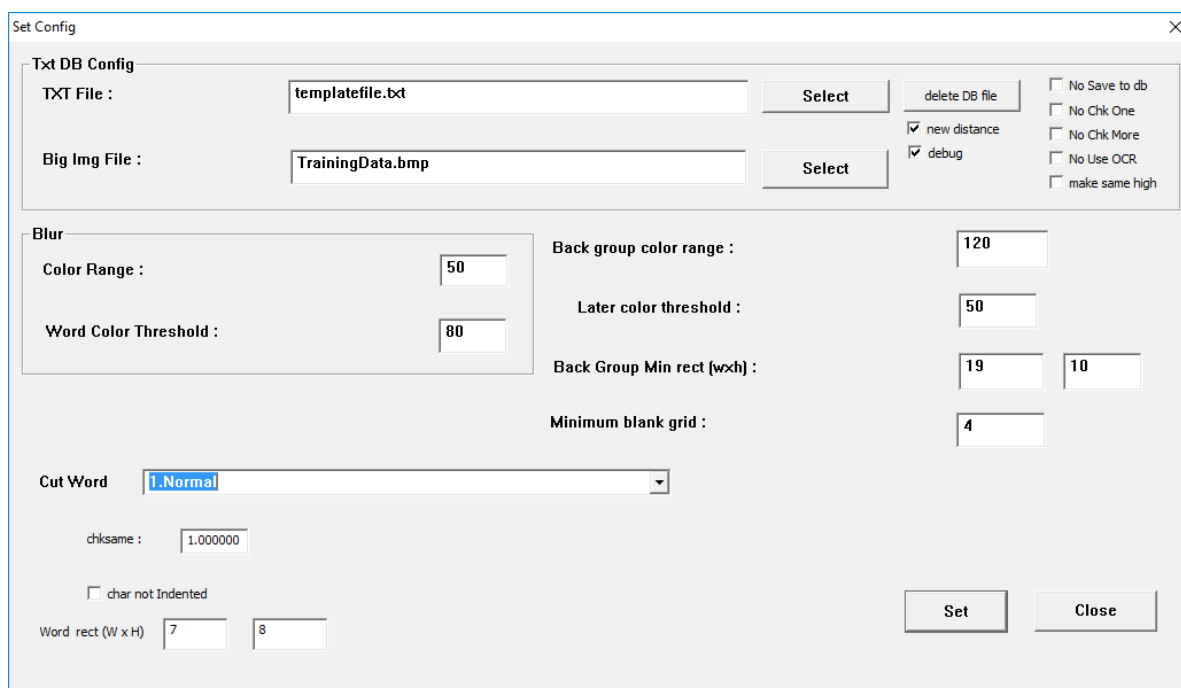


4.1.2. Tools Menu



Set Config	Set the global OCR parameter
OCR Debug	Enable OCR Debug
Adjust Color Variation	Debug the parameter
Correction	Define the character definition

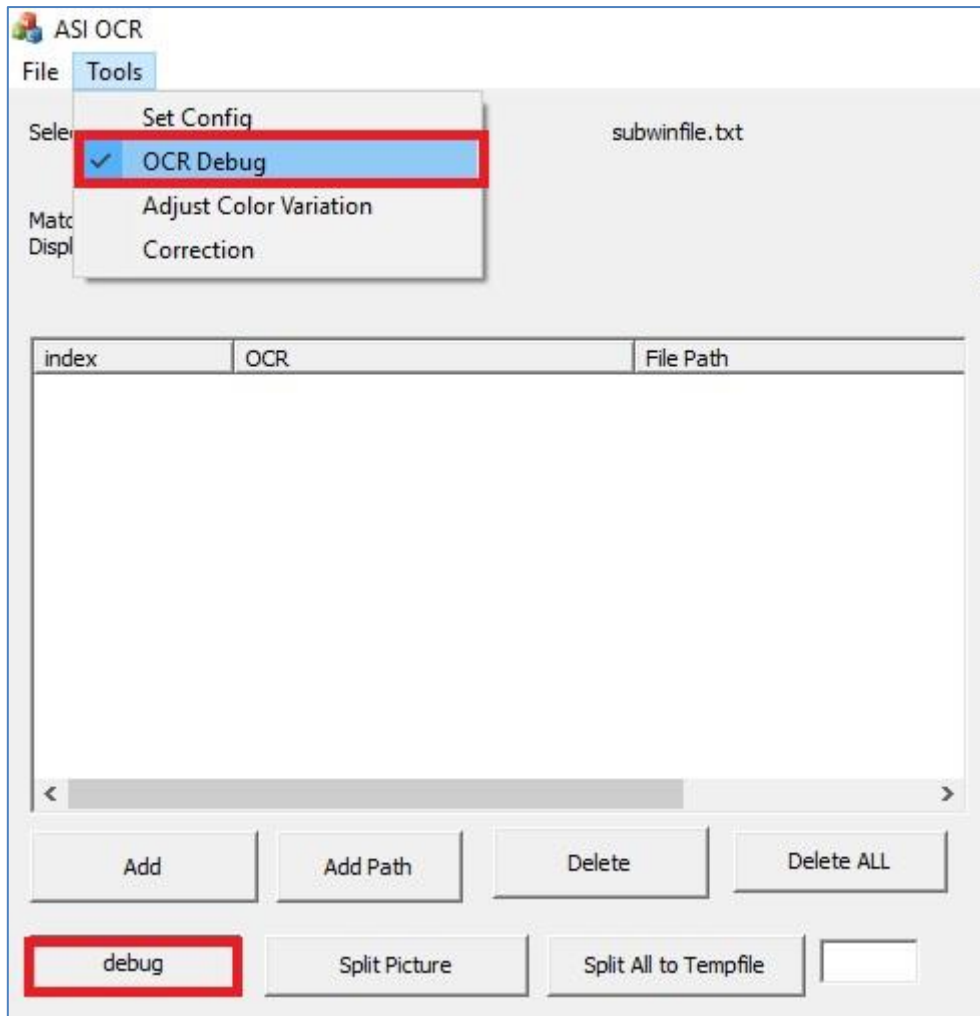
Set Config



Set the OCR parameters. Parameters are described in section 3.1.2, see Asi-OCR Tool Panel.

OCR Debug

Click Tools → OCR Debug and click the debug button or



click Set Config→Check debug→Click Set button and click debug button
to open the OCR Debug

P.S. If you want to preview the OCR results, you can step by step as followings:

1. Click “Add” or “Add Path”
2. Click “Split All to Tempfile” (You can also input the character format {W, L, I, N} on the right textbox)

And the results are shown on the OCR column

ASI OCR

File Tools

Select subWindow DB File :

subwinfile.txt

Match with sample :

Displacement (x,y) :

index	OCR	File Path
-------	-----	-----------

1

Buttons: Add, Add Path, Delete, Delete ALL, debug, Split Picture, Split All to Tempfile

2

Set Config

Txt DB Config

TXT File :

Big Img File :

new distance
 debug

No Save to db
 No Chk One
 No Chk More
 No Use OCR
 make same high

Blur

Color Range : Back group color range :

Word Color Threshold : Later color threshold :

Back Group Min rect (w×h) :

Minimum blank grid :

Cut Word :

chksame :

char not Indented

Word rect (W x H)

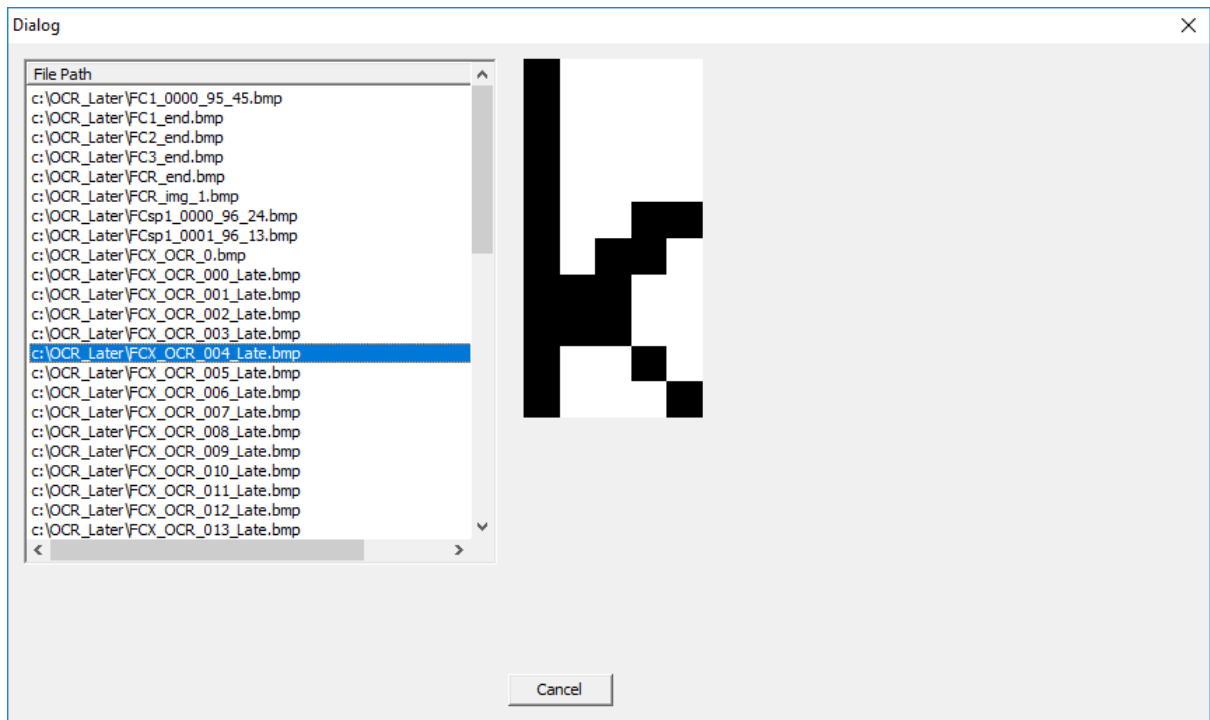
ASI OCR

File Tools

Select subWindow DB File :

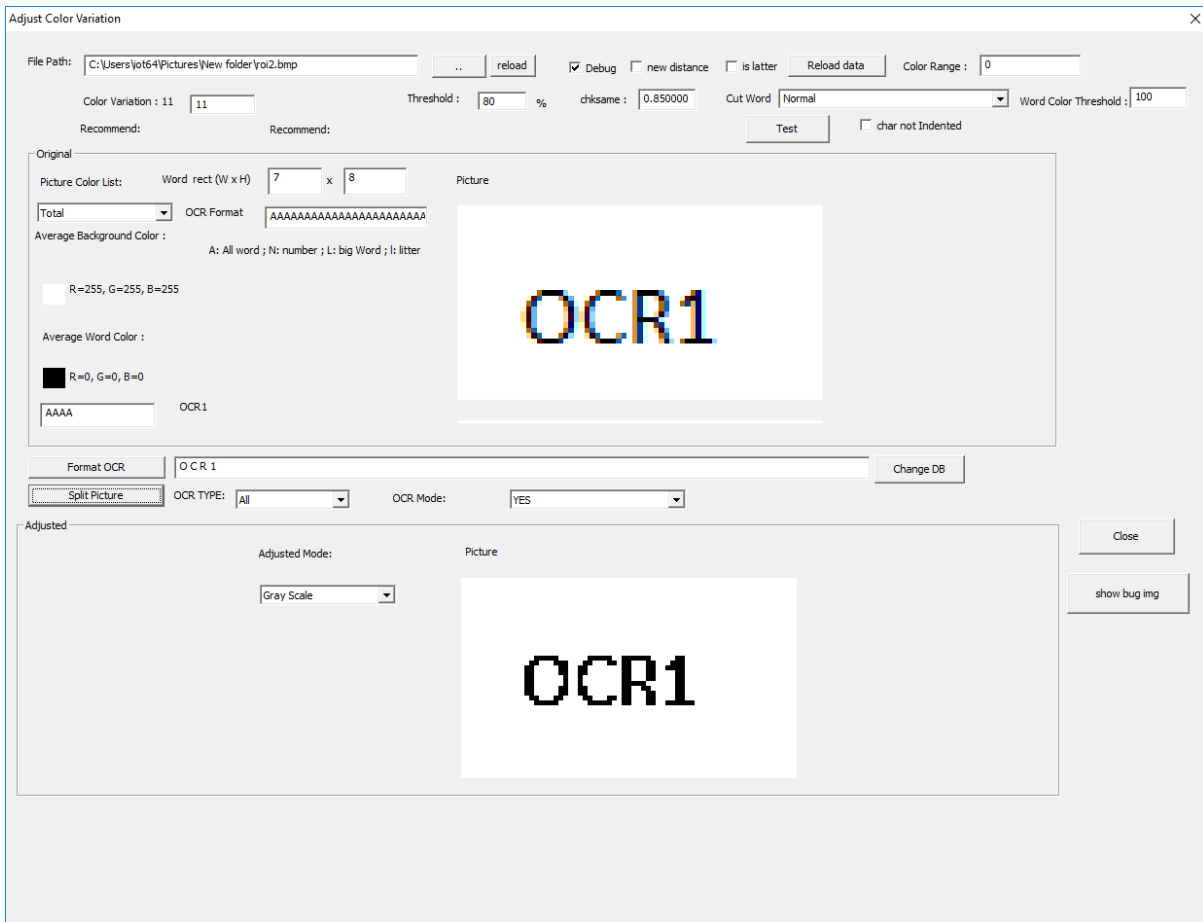
Match with sample :
 Displacement (x,y) :

index	OCR	File Path



A Panel to browse OCR_Later images.

Adjust Color Variation



The tool supports a tuning feature that allows it to generate a good set of search parameters, for identifying individual characters in the string.

Follow the steps to correct OCR result or construct OCR database:

1. File Path : Load Picture, picture will be loaded and displayed.
2. Press "Split Picture". Apply OCR to loaded picture.
3. The OCR result will be showed on textbox.
4. If the result is incorrect, modify the result.
5. Press "Change DB" to save result.
7. Press "Split Picture" again, it shows the corrected result.

You may need to reload OCR DB in main program after correction.

Character strings that can be successfully analyzed with an OCR tool typically share most of the following characteristics:

Clear Image, the image contains sharp character edges.

We can use the three parameters for tuning the ROI image

For example: Different ROI Group using different ROI parameter

- Background color range
- Later Color threshold
- Similarity

The target machine’s script group has 3 ROI group. It is possible to separate the ROI group from script file.

However we provide more type of parameter for different group of ROI.

Group1	
Background color range:50	0563817008563
Later Color threshold: 30	B2-00201
Similarity(chksame):0.8	0563817008573
	0563817008567

Group2	
Background color range:50	Cycle: 52.6 sec Cycle: 39.4 sec
Later Color threshold: 30	Inspection: 2.3 sec Cycle: 29.4 sec
Similarity(chksame):0.8	Cycle: 51.3 sec

Group3	
Background color range:120	1229028 1472072 1453102 670670 1472072
Later Color threshold:47	
Similarity(chksame) :0.7	

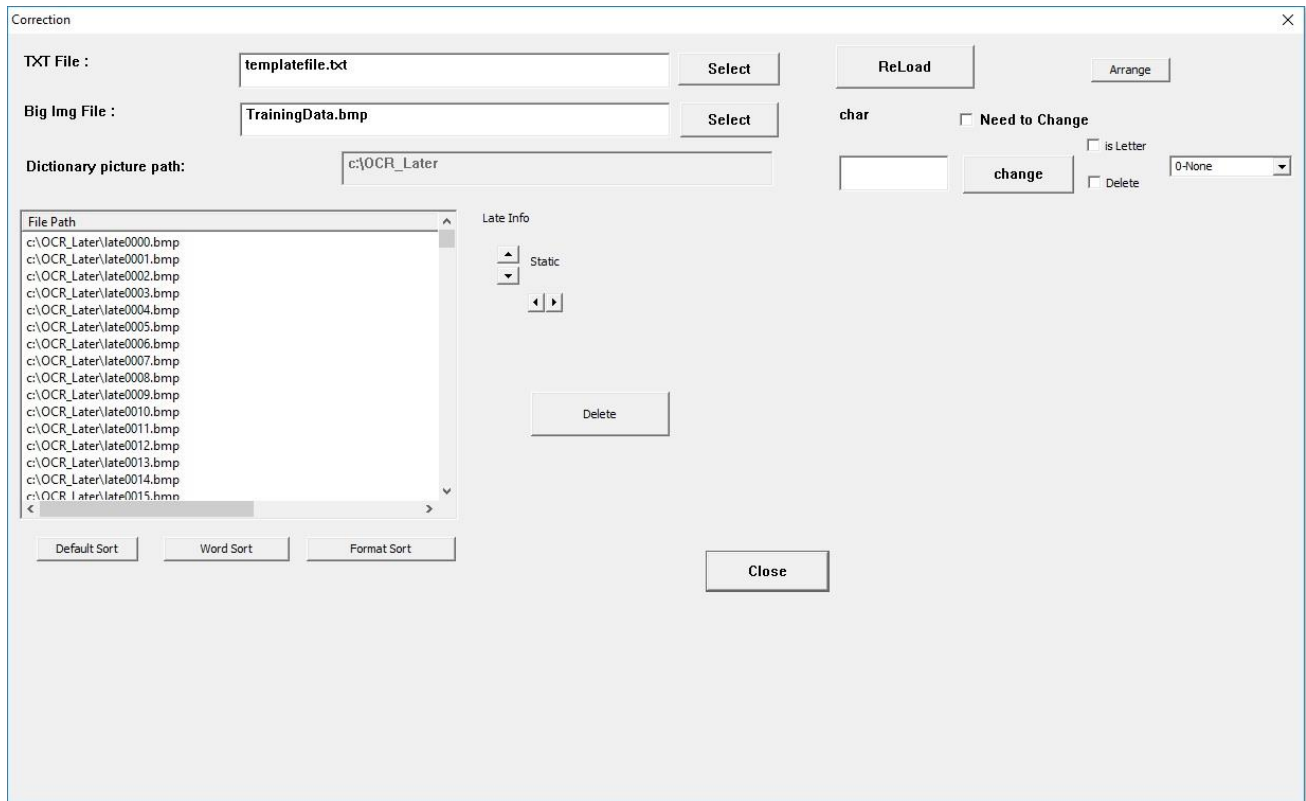
Group4	
Background color range:120	5205310-A01-B-TESTBOARD
Later Color threshold:40	NONE
Similarity (chksame):0.8	5205310-A01-B-TESTBOARD

By using the Color Variation and Threshold, the character will split the background color and word color

If you would like to check the every process for the character handling, you can click the “show bug img” to see the every image processes. The image processes could provide you more information on character changing and adjust the better parameters.

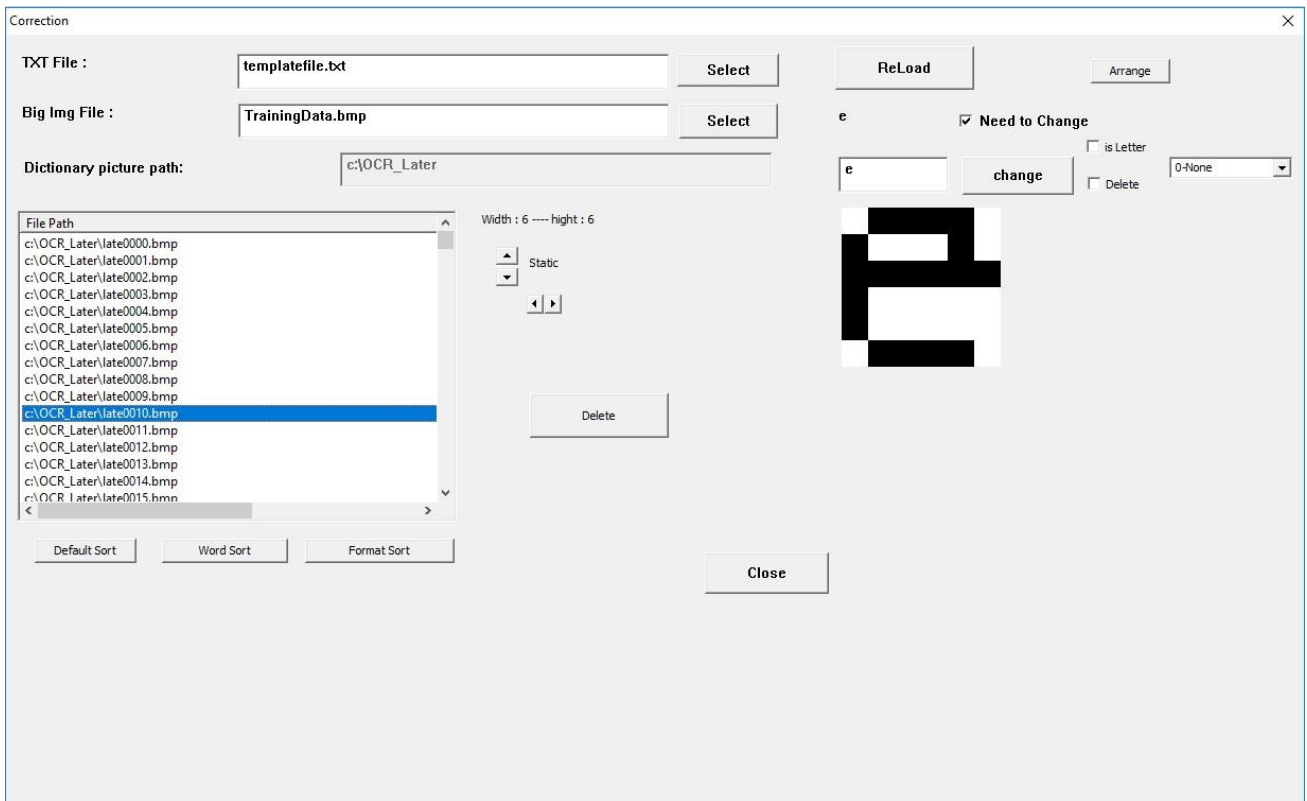
Correction

Using an OCR tool to analyze a character string with potentially difficult characteristics is possible with the right configuration parameters.



Correction function will load two configuration file templatefile.txt/ TrainingData.bmp

We can watch the character results by the tool. If the character result is wrong, we can revise the character definition (click the "change button")



Even after tuning, an OCR tool can still fail to verify a couple of characters in the string.

By similarity threshold for individual character parameters (Tool -> Set Config -> Similarity), it can improve the recognition rate.

Arrange: Reload the DB and deleting character bmp file not reserved in the DB

Delete: Delete the selected character bmp file

Late Info: Show the character width and height and the character in DB position (High and Width line) and the total the same character counts

Character Format:

- 0-None: No character format
- 1-Number: The character is the number format
- 2-Uppercase Letter: The character is the Uppercase Letter format
- 4-Lower case Letter: The character is the Lowercase Letter format

For the detailed description, please refer to section 7.2 Asi OCR Training



5. Script Command

5.1. Script rules

1. Only one script can run at the same time.
2. Some of script instructions need to execute “Connect”, please refer section 5.2
3. In a script, the last command must be “Disconnect”.
4. The script executor priority table: (“MSMQ Execute Script” please refer section 7.4)

Running Script \ Interrupt Script	AutoRun Script	MSMQ Execute Script	Manual Execute Script	Digital input (DIN2) Trigger Script
AutoRun Script	Overwrite running script	Overwrite running script	Overwrite running script	Overwrite running script
MSMQ Execute Script	Skip Interrupt Script	Overwrite running script	Overwrite running script	Overwrite running script
Manual Execute Script	Skip Interrupt Script	Skip Interrupt Script	X	Overwrite running script
Digital input (DIN2) Trigger Script	Skip Interrupt Script	Skip Interrupt Script	Skip Interrupt Script	Overwrite running script

5.2. Script Instruction Description

Instruction Category

- 1) Communication Function
- 2) Script Control
- 3) Page Identification
- 4) Data Processing
- 5) OCR Function
- 6) Mouse Action
- 7) Keyboard Action

Some of instructions need to execute “Connect” first, you can check the following table.

Instruction Table

#	Category	Instruction Name	Description	Connect Necessary
1	Communication	Connect	<p>Should able to start capturing the source signal and run script</p> <p>W: frame numbers to skip in multipage mode.</p> <p>H: Page Mode 0: No Page Identify 1: page identify with multiple pages 2: page identify with single page 3: page identify with single page or multiple pages (Auto-Recommend)</p> <p>Q: OP Screen Mode 0: off 1: on 2: on (Local Mode)</p>	No
2	Communication	Disconnect	Should able to stop capturing the source signal and stop script	Yes
3	Communication	DI ReadLine	<p>Read digital input.</p> <p>X: line number of digital input Y: if DI ==0 +x: goto previous step, 0: go to end; -x go to next steps W: if DI ==1 +x: goto previous step, 0: go to end; -x go to next steps</p>	No
4	Communication	LED Control	<p>Set the LED On/OFF</p> <p>X:number of the LED, EX:LED_U1, please input 1 Y:ON/OFF status 0:OFF 1:ON</p>	No
5	Communication	Get Modbus IO Status	<p>Read value to modbus device</p> <p>Modbus CMD: predefined Modbus read command</p>	No

			Items: items to store read value	
6	Communication	Set Modbus IO Status	Set value to modbus device Modbus CMD: predefined Modbus write command Values: value to write	No
7	Communication	show EAP Log	Send Message to private queue with MSMQ. The name of private queue can be set in MSMQ Setting . Text: message to sent	No
8	Script Control	Go to	Jump to a specified script instruction. X: number of instructions to jump 0: go to the last instruction >0: go to previous x steps <0: go to next steps Y: Goto Mode 0: jump by instruction number 1: jump by label Text: instruction label to jump to if Y equals 1	No
9	Script Control	Set Label	Set a label for branch instructions (Go to, Page Id) to jump. Text: label name	No
10	Script Control	Sleep	Suspends the script for the specified number of milliseconds.	No
11	Script Control	Loop	Execute specified steps cyclically X: Loop in execution. ≠0:Previous number of instructions; =0:Go to the last instruction >0: go to previous steps; =0: go to the last instruction <0: go to next steps Y: Loop is ended. ≠0:Next number of instructions; =0:Go to the last instruction >0: go to next steps	No

			<p>=0: go to the last instruction <0: go to previous steps;</p> <p>W: This value denotes the iteration times of the loop Q: should be 0</p> <p>Note: Do not use 2 Loops for nested-loop. Use Loop & Loop2 instead.</p>	
12	Script Control	Loop2	<p>Execute specified steps cyclically. Parameters are the same as Loop</p> <p>Note: Do not use 2 Loop2s for nested-loop. Use Loop & Loop2 instead.</p>	No
13	Page Identification	Page Id	<p>Identify the page id of current frame and jump to certain instruction if page id equals given id number.</p> <p>X: number of instructions to jump (see Go to) Y: jump mode. 0: jump by instruction number 1: jump by label W: target page id Text: instruction label to jump to if Y equals 1</p> <p>E.g. For setting Y=1, W = 3, Text = "page3", script will jump to the instruction labeled "page3" if current page id is identified as 3. See more examples in 5.2.</p>	Yes
14	Page Identification	Screen Shift Cab	<p>Detect horizontal offset from grabbed image and correct the offset in ± 3 pixels if detection successes.</p> <p>X: number of instruction to jump if calibration failed (see Go to) Y: jump mode</p>	Yes

			<p>0: jump by instruction number 1: jump by label</p> <p>Q: Threshold 1-100 to page matching. 100 means 100% matching. 0: default value, 95</p> <p>Note. Calibration is done with page identification patterns, in others words, if there is no page identification pattern, this instruction will result in fail.</p>	
15	Data Processing	MSG SAVE TABLE TO LOG	<p>Save selected table items to file. The indices of selected is specified by Text. X: 0 for save all items and 1 for save selected items.</p> <p>Y: log file path 0: default log file (<MyDocmuments>\RCM_TABLE_LOG)</p> <p>W: log format 1: JSON format (<Program Files>\ADLINK\DEX-100\main\LogJson\MachineStatusLog) 2: XML format (<Program Files>\ADLINK\DEX-100\main\LogXML\MachineStatusLog)</p> <p>H: send to DDS/Restful module 1: true 2: false</p> <p>Q: Restful Upload style 0: once 1: one by one</p> <p>Text: log file path or selected indices.</p> <p>Note. Index format: a~b [; c~d]*. For example: If index equals to 1~3; 5~7; 9~10, then Item #1, #2, #3, #5, #6, #7, #9, #10 will be selected to process.</p>	No

16	Data Processing	Replace string	<p>Replace oldValue with newValue for the selected Table item.</p> <p>X: item index Text: oldValue newValue</p> <p>Note: The oldValue and newValue have to split by Tab. If newValue is not given, oldValue will be replaced by empty string.</p>	No
17	Data Processing	Replace string by regex	<p>Replace pattern with newValue by regex for the selected Table item.</p> <p>X: item index Y: regex option 0: None 1: ignore case when matching 2: multiline mode, where <code>^</code> and <code>\$</code> match the beginning and end of each line 16: single-line mode, where the period (<code>.</code>) matches every character (instead of every character except <code>\n</code>) 32 : Exclude unescaped white space from the pattern, and enable comments after a number sign (<code>#</code>).</p> <p>Text: pattern newValue Note: The pattern and newValue have to split by Tab. If newValue is not given, pattern will be replaced by empty string. See more details for regex option in https://docs.microsoft.com/en-us/dotnet/api/system.text.regularexpressions.regexoptions?view=netframework-4.7.2.</p>	No
18	Data Processing	set Table Value	Set value to selected table item. Use Q to select comparison or arithmetic function.	No

			<p>Set Value Function</p> <p>Q = 0: Set value to selected table item</p> <p>X: item index.</p> <p>Text: value.</p> <p>Comparison Function</p> <p>Q</p> <p>1: compare item and target as integer numbers</p> <p>2: compare item and target as strings</p> <p>5: compare item and target as float numbers</p> <p>X: item index</p> <p>Y: jump offset if item value equals to target value</p> <p>W: jump offset if item value is larger than target value</p> <p>H: jump offset if item value is less than target value</p> <p>Text: target value.</p> <p>Arithmetic Function</p> <p>Q:</p> <p>3: subtract target value from item as integer numbers</p> <p>4: add target value to item as integer numbers</p> <p>X: item index</p> <p>Text: target value.</p>	
19	Data Processing	Table Compare	<p>This instruction evaluates the expression and branch to other instruction according to result.</p> <p>X: Compare Succeed.</p> <p>+x: go to previous steps;</p> <p>=0 go to the last instruction</p> <p>-x: go to next steps</p> <p>Y: Compare failed and expression error.</p>	No

+y: go to previous steps;
=0 go to the last instruction
-y: go to next steps

Text: Comparison expression. Maximum Length: 128

Available Expression Functions (Function names and strings are case sensitive):

Table(): retrieve table item as string.

ReadFile(): read file from path

Num(): convert string to float number.

E.g. Table(3) == "123"

E.g. Table(0)==ReadFile("C:\\input.txt")

E.g 1.5<=Num(Table(0)) &&

Num(Table(0))<=4.2

Available Expression Operators:

()

+ - * / %

< <= == != >= > !

&& ||

Note 1.

String operations are available (+, < <= == != >= >).

"appl" + "e" == "apple"

"apple" > "app" is true

See, [.Net String.CompareTo](#) for more details.

Note 2

Use '\ ' as an escape character.

\a Alert

\b Backspace

\f Form feed

\n New line

			\r Carriage return \t Horizontal tab \v Vertical tab \' Single quotation mark \" Double quotation mark \\ Backslash Note 3. Integer division is supported. 3/2 equals to 1 3.0/2 equals to 1.5	
20	OCR Function	Check Text	Check OCR result and compare with input text	Yes
21	OCR Function	Get bmp	Get screen image	Yes
22	OCR Function	Get bmp rect	Get bmp selection.	Yes
23	OCR Function	Get bmp rect array	Perform OCR to selected ROIs. This instruction is normally generated by "Combine Script". Q: Snapshot current frame to jpg or png(default). The folder will be <MyDocuments>\RVM_OCR_IMG and the filename is current time, YYYYMMDDHHmmss.png (or jpg) 0: disable 1: enable (refer to Script Setting image format setting) H: Write log to log-file if H equals1.	Yes
24	OCR Function	img refresh	Refresh page by grapping new frame X: frames to skip 0: disable 1: enable W: value of frame number to skip	Yes
25	OCR Function	Send OCR	Sending OCR result to buffer If OCR Mode = 0, Unique cfg:	Yes

			<p>Back group color range: Picture noise, picture to gray scale, adjacent point chromatic aberration is less than this value is white, greater than this value is black.</p> <p>Later color threshold: Picture chromatic aberration threshold percentage value, after the picture turns the gray scale, makes the color judgment to the black position; the larger the value retains the more black spots.</p> <p>Minimum blank grid: The smallest blank pixel length between words and characters, and if the white space pixel length is greater than this value, it is treated as a space between words and words.</p> <p>Blur Noise \ Blur Threshold: When the background color is removed in the above range, the image still is not matched, these two parameters are adjusted again for the blur noise and threshold</p> <p>Cut Word: Normal(0): It reflect the truly image, so it make every joined characters to a character Precise(1): Make every character a white space even if any two joined characters</p> <p>Note: It can't use with "Get Color" and "Check Color" in the same image layer</p>	
26	Script Control	Get Color	<p>X: Color coordinates x Y: Color coordinates y W: Color width H: Color height It supports single color or multiple colors for this ROI</p>	Yes

			<p>1. multiple colors Text: R;G;B\R;G;B\R;G;B Three color example: 255;255;255\0;0;0\212;30;56</p> <p>2. single color Text: R;G;B Single color example 255;255;255 Note: It can't use with "Send OCR" in the same image layer</p>	
27	Script Control	Check Color	<p>X: Check color succeed +x: go to previous steps; =0 go to the last instruction -x: go to next steps Y: Check color failed -y: go to previous steps; =0 go to the last instruction +y: go to next steps W: Get color command number The first command need to set 0, the second is 1, so the nth command is n+1 H: Check color command number of the Get Color The first color need to set 0, the second color is 1, so the nth color is n+1 Q: Retry times If 0 not retry, else set n is retry times Note: It can't use with "Send OCR" in the same image layer</p>	Yes
28	Mouse Action	Left Click	<p>Perform mouse left click action</p> <p>X: cursor coordinates x Y: cursor coordinates y W:cursor detection enable Enable is 1, Default is disable</p>	Yes
29	Mouse Action	Left Click Down	<p>Send mouse left click down event</p> <p>X: cursor coordinates x</p>	Yes

			Y: cursor coordinates y W:cursor detection enable Enable is 1, Default is disable	
30	Mouse Action	Left Click UP	Send mouse left click up event X: cursor coordinates x Y: cursor coordinates y W:cursor detection enable Enable is 1, Default is disable	Yes
31	Mouse Action	Left D Click	Perform mouse left double click action X: cursor coordinates x Y: cursor coordinates y W:cursor detection enable Enable is 1, Default is disable	Yes
32	Mouse Action	Right Click	Perform mouse right click action X: cursor coordinates x Y: cursor coordinates y W:cursor detection enable Enable is 1, Default is disable	Yes
33	Mouse Action	Right Click Down	Send mouse right click down event X: cursor coordinates x Y: cursor coordinates y W:cursor detection enable Enable is 1, Default is disable	Yes
34	Mouse Action	Right Click UP	Send mouse right click up event X: cursor coordinates x Y: cursor coordinates y W:cursor detection enable Enable is 1, Default is disable	Yes
35	Mouse Action	Right D Click	Perform mouse right double click action X: cursor coordinates x Y: cursor coordinates y W:cursor detection enable	Yes

			Enable is 1, Default is disable	
36	Mouse Action	Medi Click	<p>Perform mouse center click action</p> <p>X: cursor coordinates x Y: cursor coordinates y W:cursor detection enable Enable is 1, Default is disable</p>	Yes
37	Mouse Action	Medi D Click	<p>Perform mouse center double click action</p> <p>X: cursor coordinates x Y: cursor coordinates y W:cursor detection enable Enable is 1, Default is disable</p>	Yes
38	Mouse Action	Move	<p>Move mouse cursor to specific coordinates</p> <p>X: cursor coordinates x Y: cursor coordinates y W:cursor detection enable Enable is 1, Default is disable</p>	Yes
39	Mouse Action	Mouse Reset	Reset cursor position to top-left of screen	
40	Keyboard Action	Alt Down +Tab	Press down ALT and press and release Tab	
41	Keyboard Action	Alt Up	Release ALT	
42	Keyboard Action	Key In	<p>Perform text key-in action.</p> <p>X: specify data source 1: from text 2: none 3: from table value 4: from file Y: table item index if key-in from table Text: text or file source to key-in.</p>	Yes
43	Keyboard Action	Send BackSpace	Press and Release backspace	Yes
44	Keyboard Action	Send Clear	Send CTRL+A and BackSpace multiple times to clear text content.	Yes
45	Keyboard Action	Send ESC	Press and Release ESC key	Yes
46	Keyboard Action	Send Enter	Press and Release Enter key	Yes
47	Keyboard Action	Send Function Key	Press and Release F1-F12	Yes

			X: specify function key 0:default (F1) 1:F1, 2:F2, 3:F3... 12:F12	
48	Keyboard Action	Send Keys	Send keys Text: key, choose the key under the “Add Key” button and click the “Add Key”, it will set the Send Keys value	Yes
49	Keyboard Action	Send Up	Press and Release UP key	Yes
50	Keyboard Action	Send Down	Press and Release Down key	Yes
51	Keyboard Action	Send Left	Press and Release LEFT_ARROW key	Yes
52	Keyboard Action	Send Right	Press and Release RIGHT_ARROW key.	Yes
53	Keyboard Action	Send Home	Press and Release Home key	Yes
54	Keyboard Action	Send Tab	Press and Release TAB key	Yes
55	Keyboard Action	Send Ctrl + C	Send CTRL + C event	Yes
56	Keyboard Action	Send Ctrl + V	Send CTRL + V event	Yes
57	Keyboard Action	Send Ctrl + A	Send CTRL + A event	Yes
58	Keyboard Action	Send Ctrl + Alt + C	Send CTRL + ALT + C key event	Yes
59	Keyboard Action	Send Alt + Space + X	Send Alt + Space + X. To maximize Window.	Yes
60	Keyboard Action	Send Alt + O	Send ALT + O key event	Yes
61	Keyboard Action	Send Alt + Space	Send ALT + Space. To open the window menu.	Yes

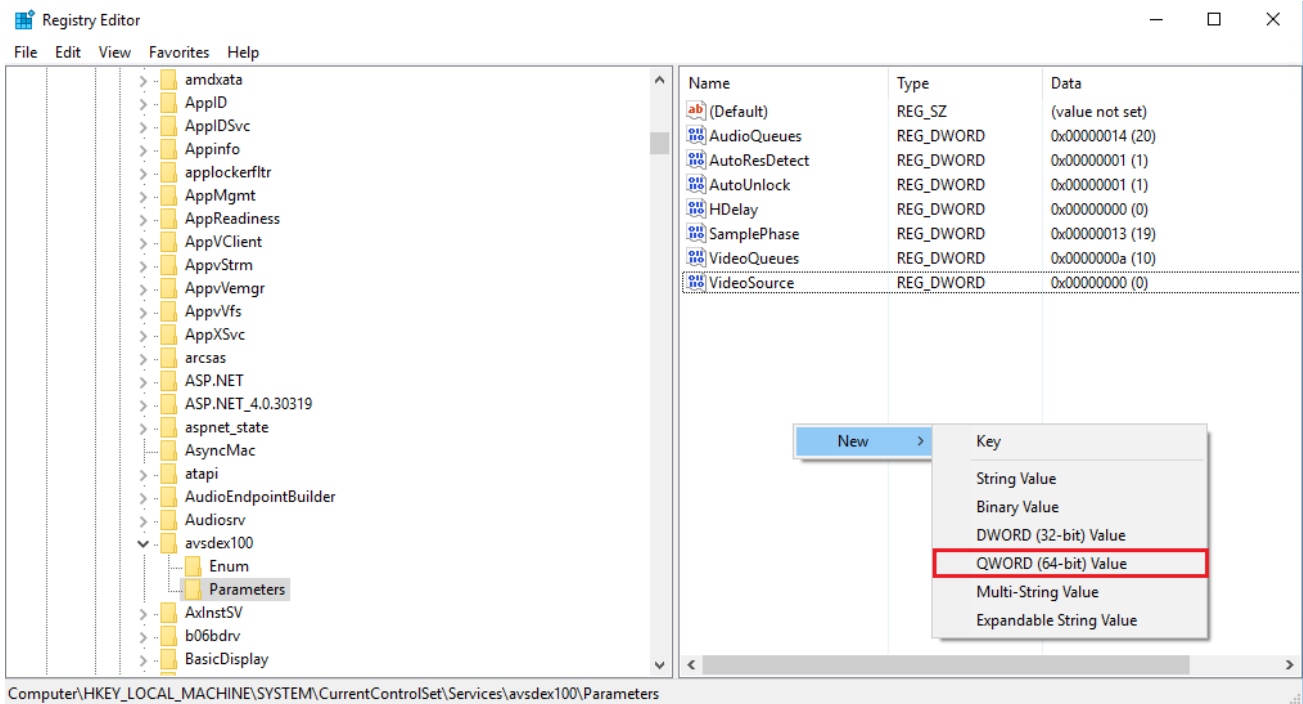
6. DEX-Pro image quality and mouse

adjustment with diagnostic tool

NOTE: Changing these setting may make DEX-100 system work unexpected.

6.1. Keyboard/Mouse Lost Precision

When you discover mouse lost the coordination as script describe. Or keyboard input to target machine lost some character. This may the target machine’s response time more then we expect. DEX-100 could defer the data transmit time to target machine by modifying Windows™ registry.



Registry Location:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\services\avsdx100\Parameters\PS2KeyboardCommandDelay

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\services\avsdx100\Parameters\PS2MouseCommandDelay

Default Value: 2

Data Type: DWORD

If DEX-100 encounters keyboard or mouse data lost, please add the above registries as following.

Name	Type	Data
VideoQueues	REG_DWORD	0x0000000a (10)
VideoSource	REG_DWORD	0x00000000 (0)
PS2KeyboardCommandDelay	REG_QWORD	0x00000002 (2)
PS2MouseCommandDelay	REG_QWORD	0x00000002 (2)

And change the delay value to a larger one (2-10) and check if the precision rate is improved.

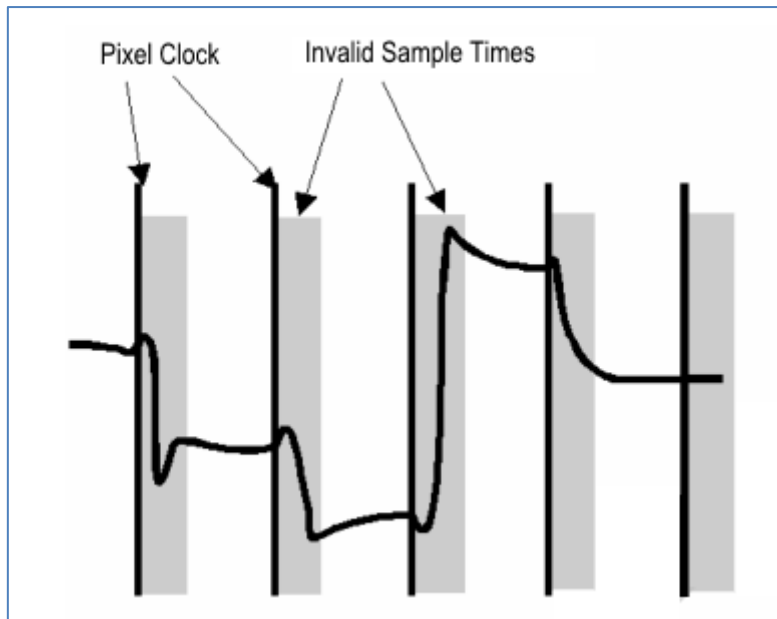
After changing value, the DEX-100 device driver must be restarted to load this new value.

Validation Approach:

Use DEX-Pro script to check mouse or keyboard is lost data.

6.2. VGA Sampling Phase Delay Adjustment

When discover frame image blur from VGA input. DEX-100 provide VGA sampling phase delay parameter.



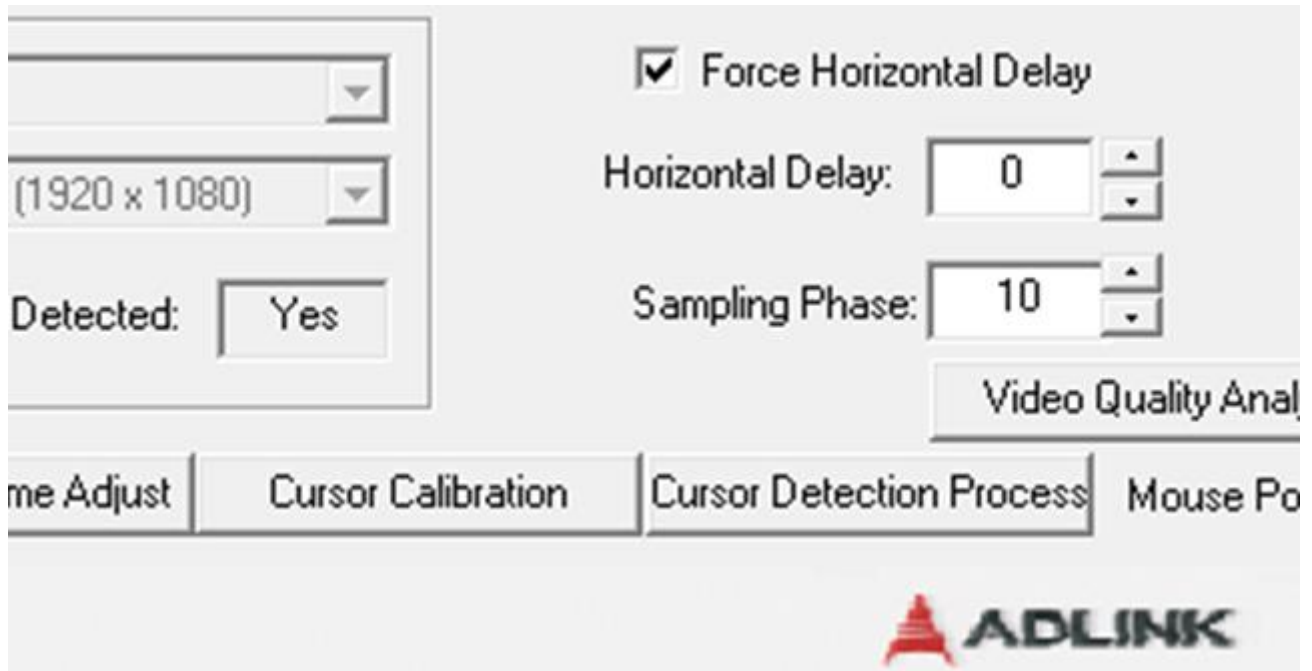
Method 1: Use Diag.exe to change setting

The screenshot shows the DEX100 Diagnostic Program interface. The window title is "DEX100 Diagnostic Program". It features various control panels for video source input, statistics, and cursor detection. The main content area displays the ADLINK logo and a promotional banner for "Enabling Easy-to-Upgrade Onboard Video Surveillance Systems with Flexible COM Express® Modules".

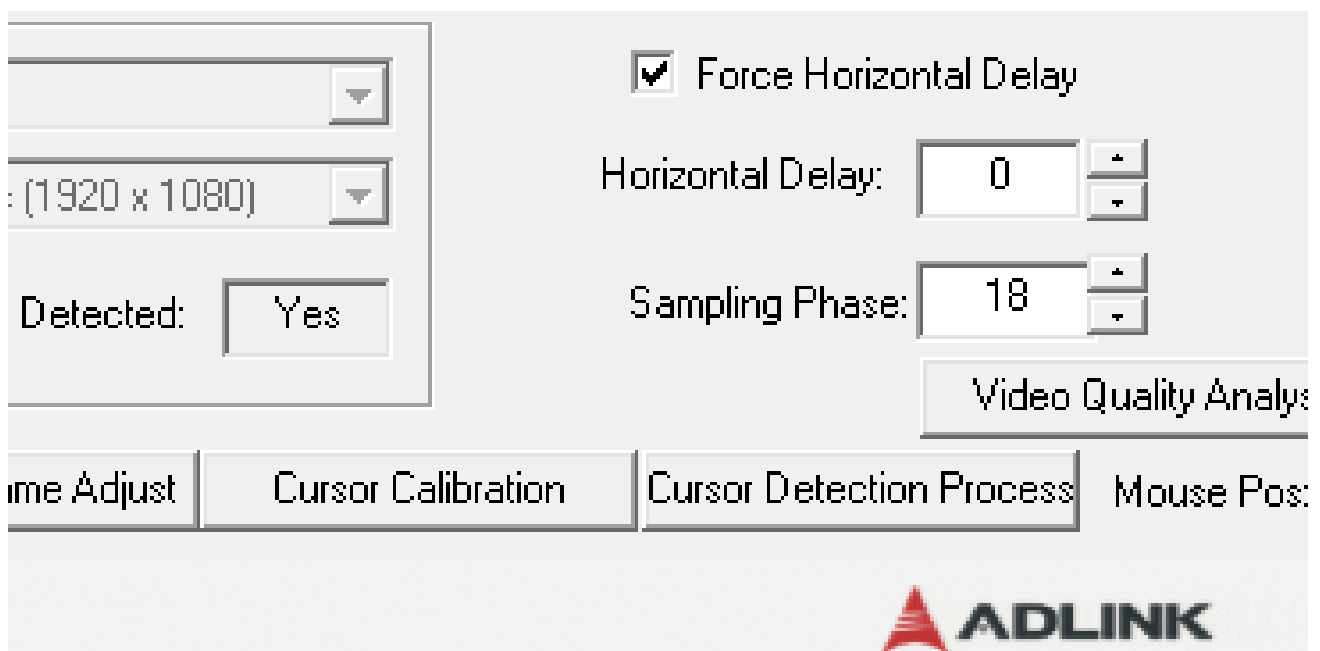
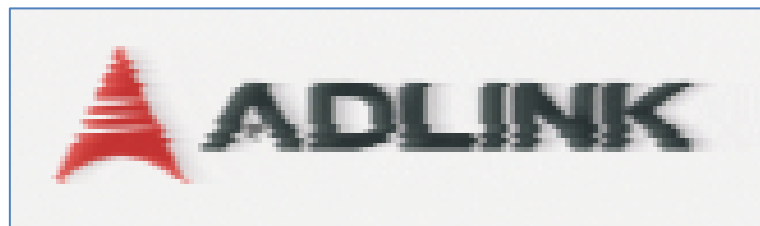
- 1) Go to the folder: C:\Program Files\ADLINK\DEX-100\utility. Open the Diag.exe and press "Start" button.
- 2) Save image to check the character or use Windows™ provided Magnify.exe (C:\Windows\SysWOW64\) to

view the character shape.

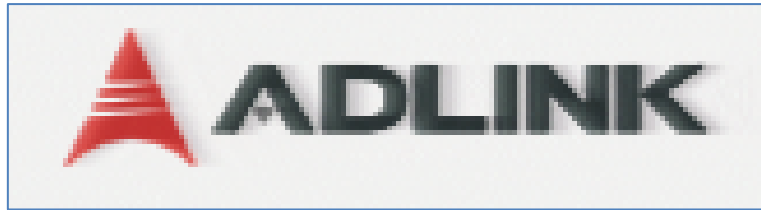
- 3) Adjust "Sampling Phase" value.



Sampling Phase value 10, "ADLINK" is aliased.



Sampling Phase value 18, "ADLINK" is cleared.



NOTE: If use Diag.exe changes the value, it would write the value to registry to keep change persistence. Watch next method 2 for registry description. When you do not keep this value, delete the registry key manually and restart DEX-100 device driver.

Method 2: Modify Windows™ registry

Registry Location:

HKLM\SYSTEM\CurrentControlSet\services\avsdex100\Parameters\SamplePhase

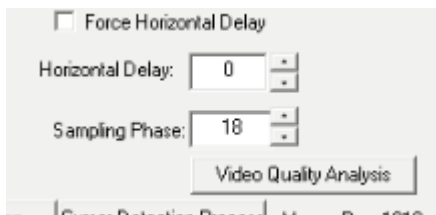
Range: 0x40 ~ 0x5F

Data Type: DWORD

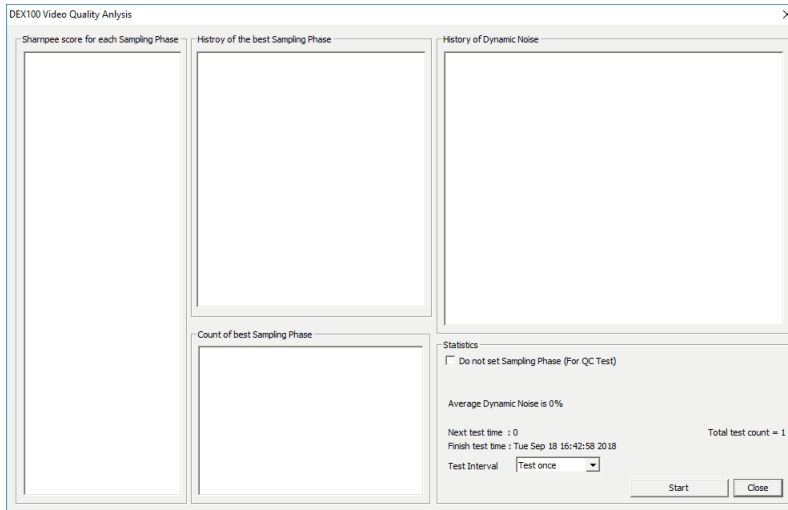
After changing value, the DEX-100 device driver must be restarted to load this new value.

Video Quality Analysis

1. Add a “Video Quality Analysis” button in Diag.exe utility. (This test only valid in VGA source)



2. When user clicks “Video Quality Analysis” button, The Diag utility pops up a dialog of Video Quality Analysis test. This test will help user to determine the best Sampling Phase and the Dynamic Noise. It finds the best Sampling Phase by setting the Sampling Phase form 0 to 31 and gets the Sampling Phase with the best sharpness score and change the Sampling Phase if it finds it. It finds the Dynamic Noise by calculating the difference of two continue images.



There are five sections in the dialog.

- i. Sharpness score for each Sampling Phase
To show the sharpness score in each Sampling Phase (0-31) in this time.
- ii. History of the best Sampling Phase
To show the history of the best Sampling Phase value with time information.
- iii. Count of best Sampling Phase
To show the count of the best Sampling Phase and list in decrease order.
- iv. History of Dynamic Noise
To show the history of Dynamic Noise with time information.
- v. Statistics
This section shows some statistics information among the test which includes if the video stable (**Note 1**), the average of Dynamic noise(**Note 2**) and the other noise information (max, min, average)
If the check box, Do not set Sampling Phase, is clicked, the Sampling Phase will not be changed after the test. (For QC test)
The testing can be stopped by clicking stop button.

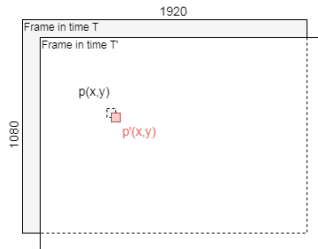
Note 1.

The Video Quality test will determine if the video is stable or not by following rule.

1. Get the total test count (**T**).
2. The count of the most Sampling Phase is **C₁**, the Sampling Phase value is **S₁**.
The count of the second Sampling Phase is **C₂**, the Sampling Phase value is **S₂**.
Ex if Count of SamplingPhase[26] = 100, than **C₁** = 100, **S₁** = 26
Count of SamplingPhase[27] = 80, than **C₂** = 80, **S₂** = 27
Count of SamplingPhase[25] = 50, than **C₃** = 50, **S₃** = 25
3. Add the count of Sampling Phase for the most (**C₁**) to the less (**C_n**) until the sum of them is over 70% of total test count.
C₁ + **C₂** + ... + **C_n** >= **T * 0.7**
4. If n=1, than the video is stable. The best Sampling Phase is **S₁**.

5. If $n > 1$, then calculate the distance between C_1 and $C_2(D_{12})$, C_1 and $C_3(D_{13}), \dots, C_1$ and $C_n(D_{1n})$ (The Sampling Phase is arranged as a circle, the distance of the ends is 1)
6. If all the $D_{mn} < 2$, then the image is stable and the best Sampling Phase is S_1 or the video may not be stable.

Note 2.

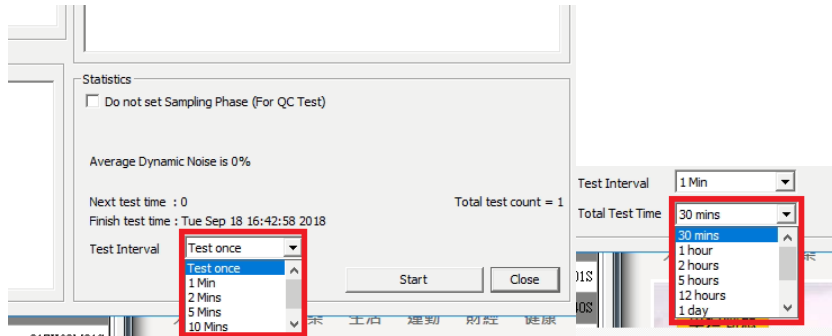


The following are the algorithm of Dynamic Noise calculating

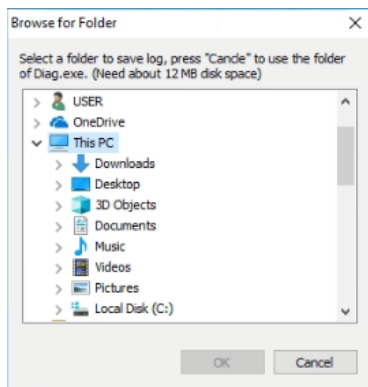
1. Capture two continue pictures P and P'. In theory these two pictures are all the same beside the noise.
2. Transform all pixels in P1 and P2 to gray level and get the average gray level of these two pictures (**A**).
3. Get the noise of each pixel by calculate the difference of this pixel in these two pictures. **Noise at (x, y) = |p'(x,y) - p(x,y)|**
4. Assume the image resolution is 1920 x 1080, then we get 2,073,600 (2 millium) noise values.
5. Calculate the Average(**a**) and Standard Deviation(σ) for these 2 millium noise values
6. Assume the noise is Normal Distribution, we can expect the 95% noise of each pixel is between $a-2\sigma$ and $a+2\sigma$.
7. The dynamic noise of this moment is **$2\sigma + a/A$** .

Setup steps

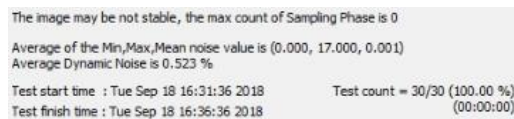
1. Set Test interval and Total Test Time. (Ex. Test interval 1 minute, and run 30 mins)



2. Click Start button to start the analysis video and select a folder to save log file first. It shows the estimated disk space. It will use the same folder of Diag.exe If user selects "Cancel".

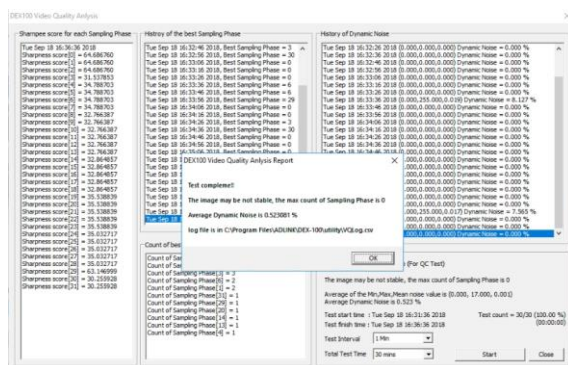


3. When the test is running, it shows some information in statistics which includes the current image status, max count of Sampling Phase, average value of the Min, Max, Mean noise, the average Dynamic Noise, next test start time, the test finish time and test count. (in percentage)



4. When the test finished, it will show a summary in message and there are a log file, VQLog.csv and test images in the folder where user choose on the beginning of the test.

It also records the Dynamic noise value in the C:\ProgramData\ADLINK\DEX100\VideoQuality\VideoQualityStatistics.xml for the Page identify ROI threshold auto tuning.



6.3. Horizontal Delay Adjustment

When target machine shows a black vertical line in DEX-Pro display frame, change the HDaly value could move the vertical line position.

Method 1: Use Diag.exe to change setting

- 1) Open the Diag.exe and press "Start" button.
- 2) Discover the left vertical line has black line.
- 3) Checked "Force Horizontal Delay" to keep the value in system registry.
- 4) Changing the "Horizontal Delay" value to check the lines disappear.

Number:

Statistic

Captured:

Frame Rate:

Video Source Input

Source:

Resolution:

Signal Detected:

Force Horizontal Delay

Horizontal Delay:

Sampling Phase:

Video Quality Analysis

Information Save Image Stop One Shot Frame Adjust Cursor Calibration Cursor Detection Process Mouse Pos: 282, 57



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Application Story
Download

Number: 0	Video Source Input	<input checked="" type="checkbox"/> Force Horizontal Delay
Statistic	Source: VGA	Horizontal Delay: 2
Captured: 42294	Resolution: CEA 1080p 60fps (1920 x 1080)	Sampling Phase: 17
Frame Rate: 25.22	Signal Detected: Yes	Video Quality Analysis
Information	Save Image	Stop
One Shot	Frame Adjust	Cursor Calibration
Cursor Detection Process	Mouse Pos: 645, 570	



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Application Story
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NOTE: If “Force Horizontal Delay” is unchecked, next time DEX-100 would not load the modified Horizontal Delay value after reboot.

NOTE: Due to the analog signal decode limitation; there may be a thin black line (about 2 pixel width) at the left side of the captured image in some resolutions (ex.1280x768).

Method 2: Modify Windows™ registry

Register Location:

HKLM\SYSTEM\CurrentControlSet\services\avsdex100\Parameters\HDelay

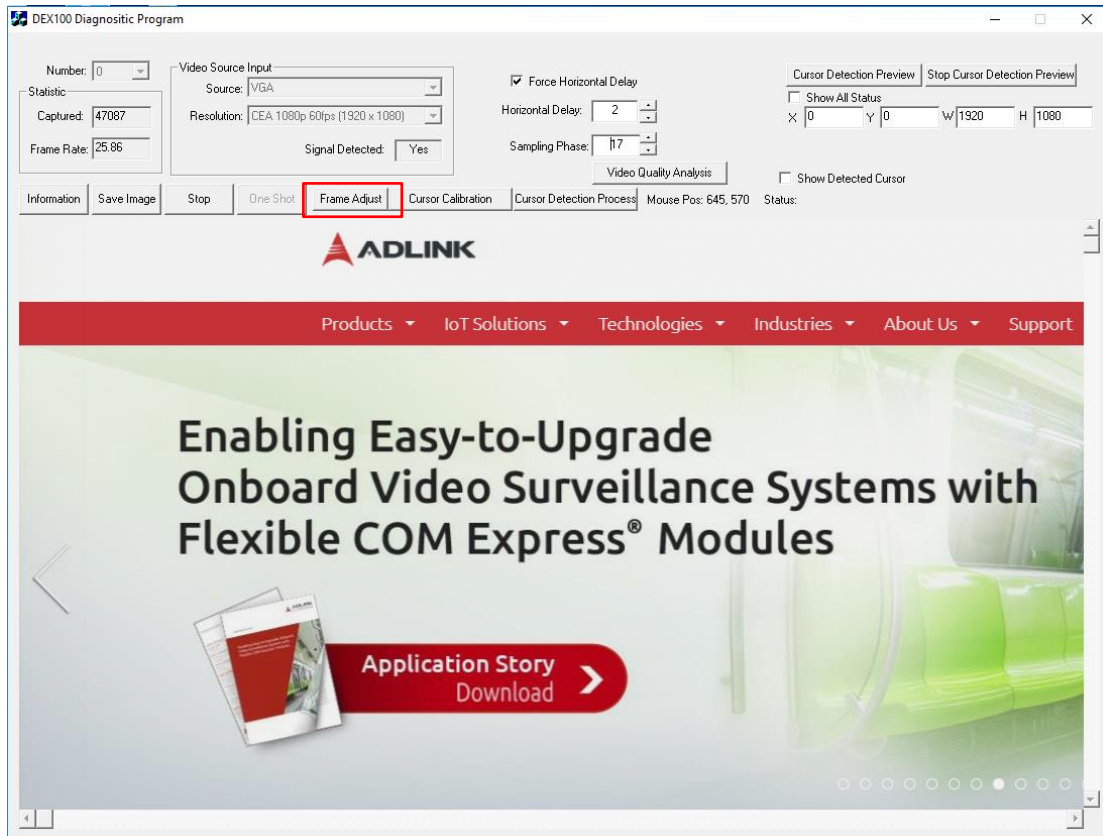
Range: -3 ~ 3 (0x80 ~ 0x87)

Data Type: DWORD

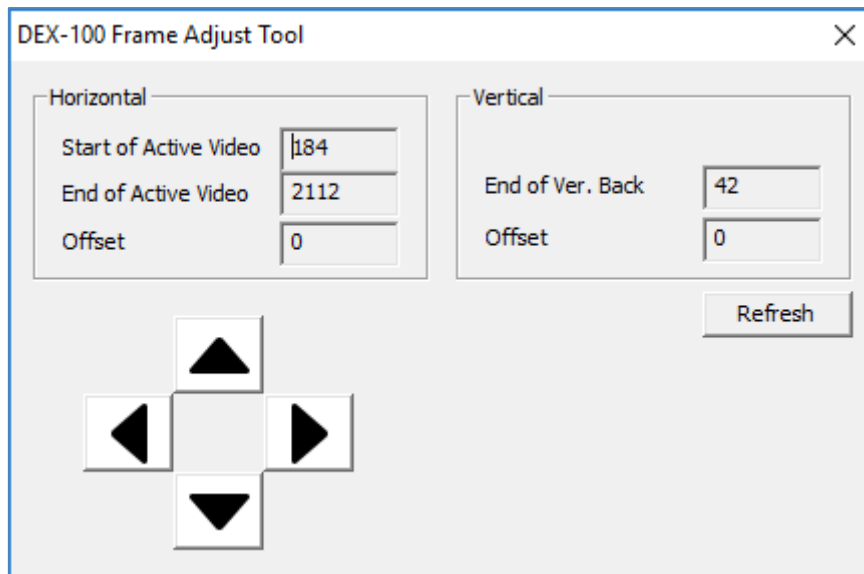
6.4. Video Frame Position Adjustment

Utility

- 1) Open **Diag.exe** and start target machine screen capturing.



2) Press **Frame Adjust** button



This dialog shows video frame horizontal and vertical display timing value (Start of Active Video/End of Active Video/End of Ver. Back). **Offset** values are adjusted via the arrow buttons. When move video frame to right, the *Active Video* should be decreased, so the *Horizontal Offset* value would be decreasing. When move video frame to up, the *Ver. Back* value should be increased, so the *Vertical Offset* value would be increasing.

After adjustment, these offset values were store in system registry.

Registry Location:

HKLM\SYSTEM\CurrentControlSet\services\avsdex100\Parameters\FrameAdjust

Default Value: 0

Data Type: DWORD

Note1: This value is not recommend to change manually.

Note2: This adjustment is only for VGA signal.

6.5. Mouse Cursor Auto Calibration

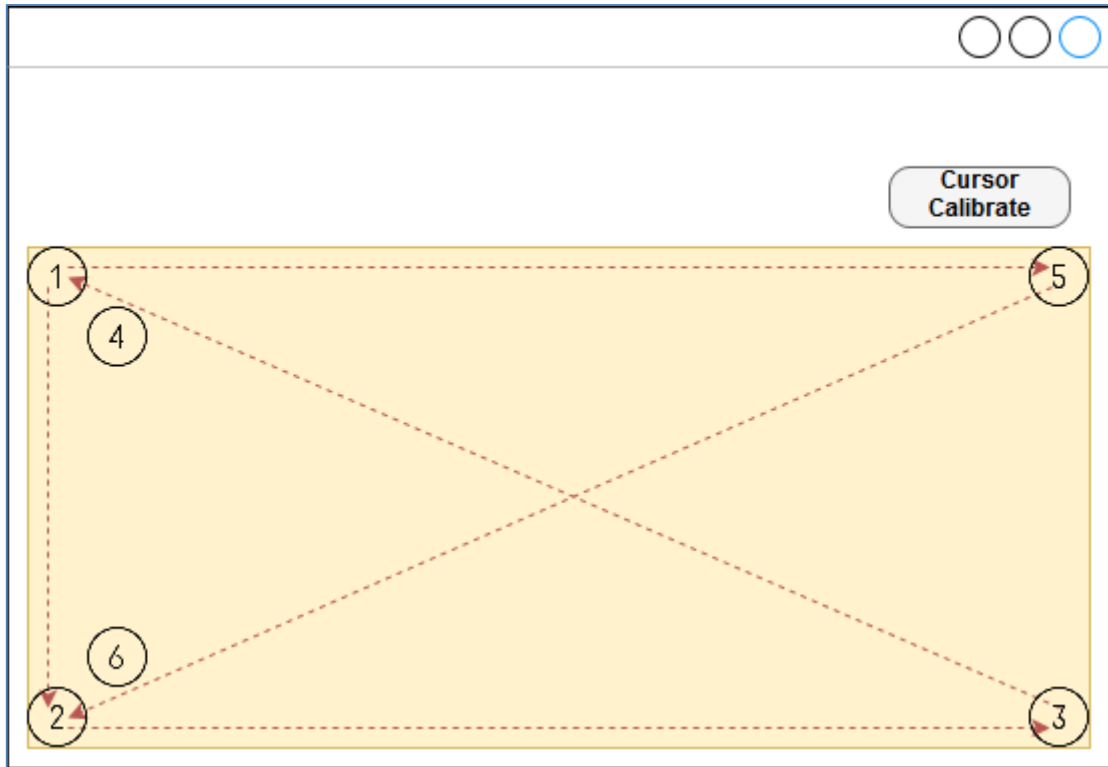
Utility

Use this function to check target PC mouse move data is sent correctly. If mouse cursor does not detect in pre-defined position, program would defer the mouse move data send speed. And restart the check progress in 5 times.

USB Input Delay range: 6~ 22 micro-second

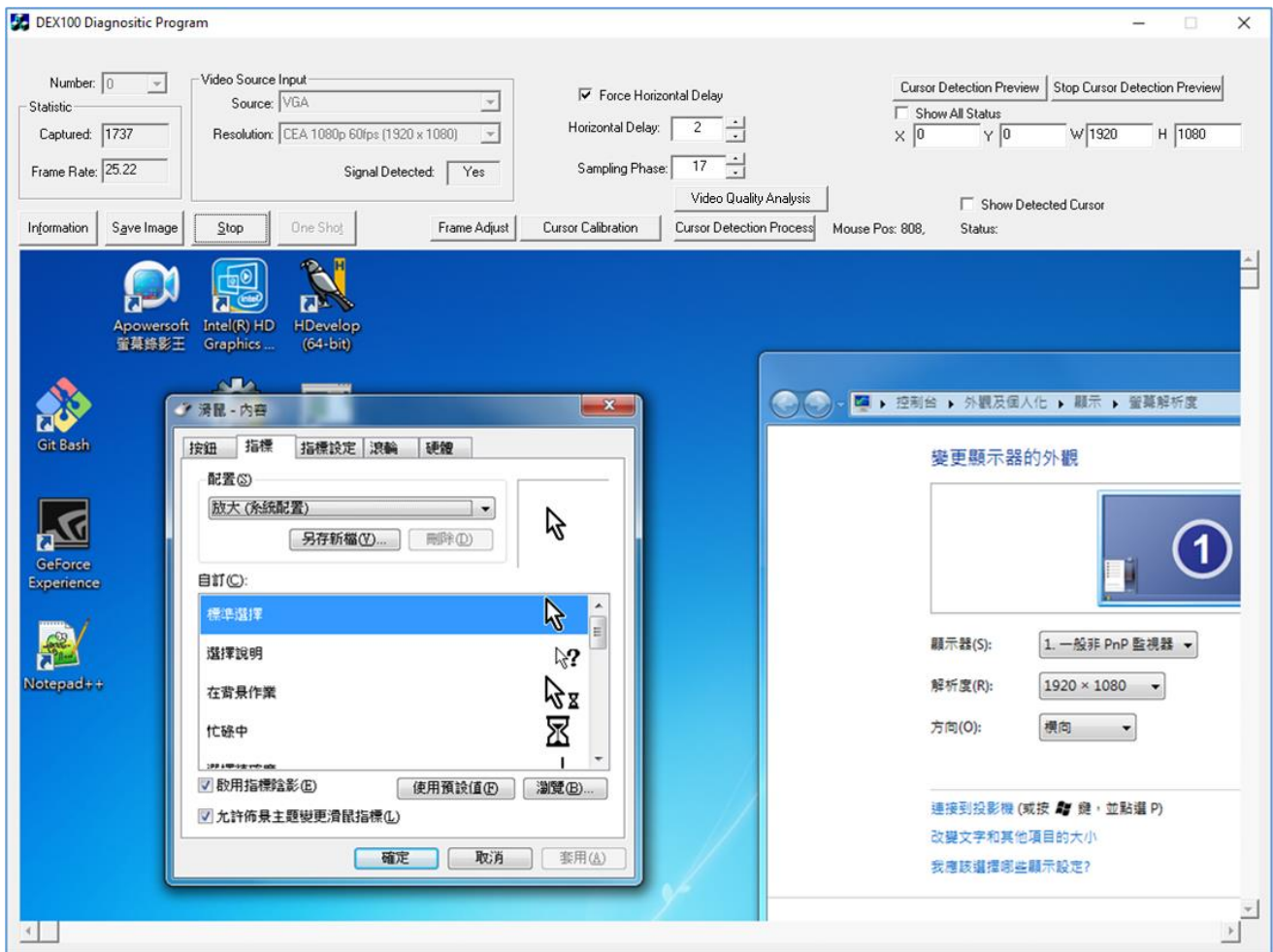
The detect path as this illustration. Program move mouse to 4 desktop corner and check the cursor is on the position.

Run in **Test Round** times.

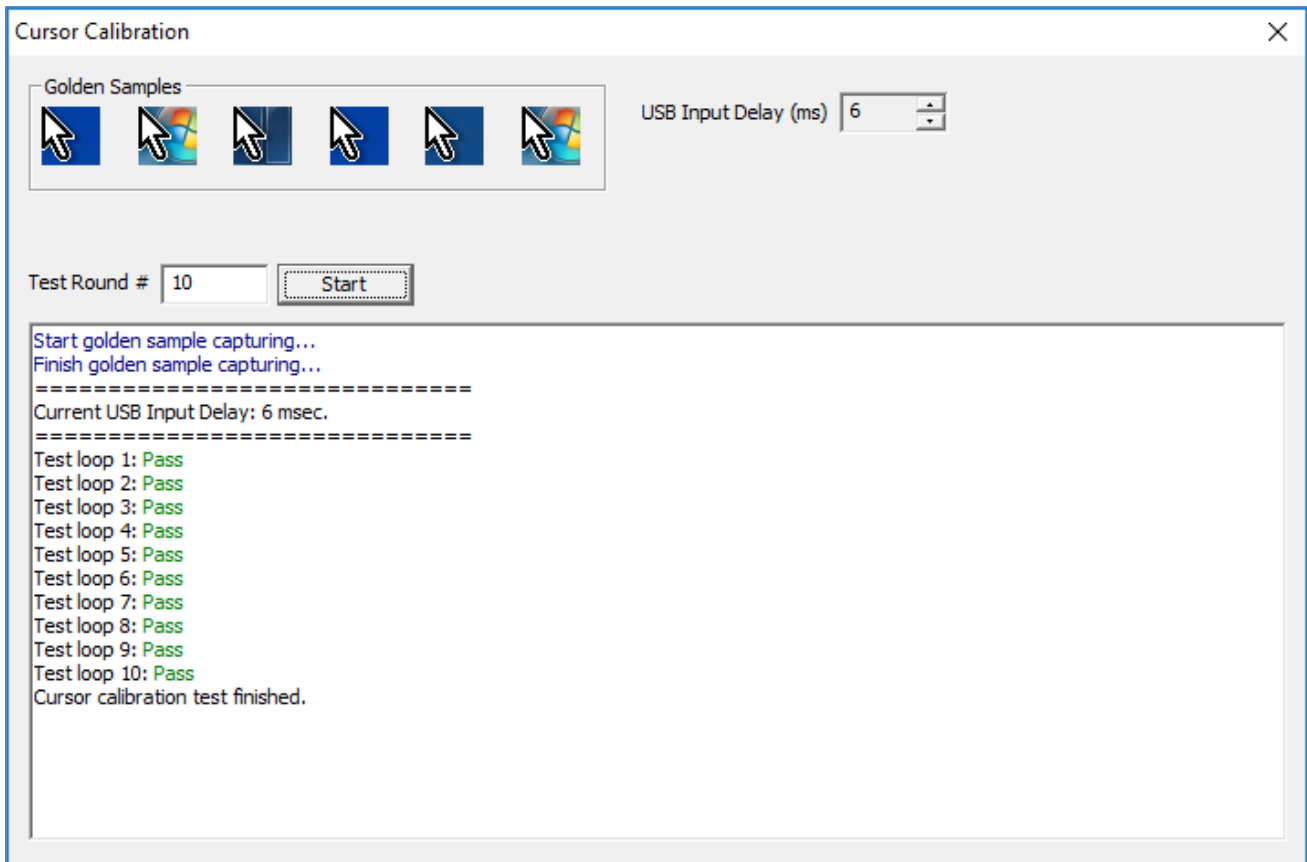


Operation Steps:

- 1) Open Diag.exe and start capturing to enable **Cursor Calibration** button.



2) Click **Cursor Calibration** button.



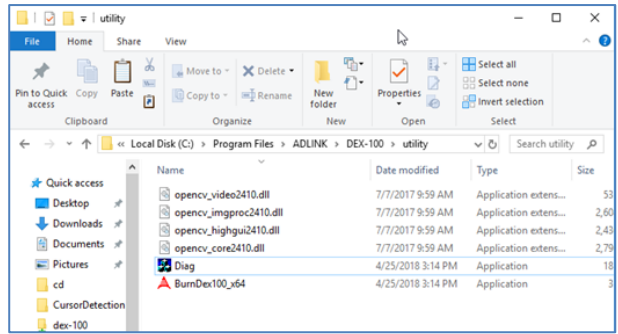
- 3) Input Test Round # number (recommend value around 100~500) and Start testing.
 - a) Program would display 6 cursor golden samples (size 32x32).

Note: Make sure these images contain cursor. If not re-start the progress or increase the "USB Input Delay"
 - b) If a round test success, log console print Pass
 - c) If a round one cursor fail, log console print Fail
 - Program auto increase USB Input Delay value and run test again.

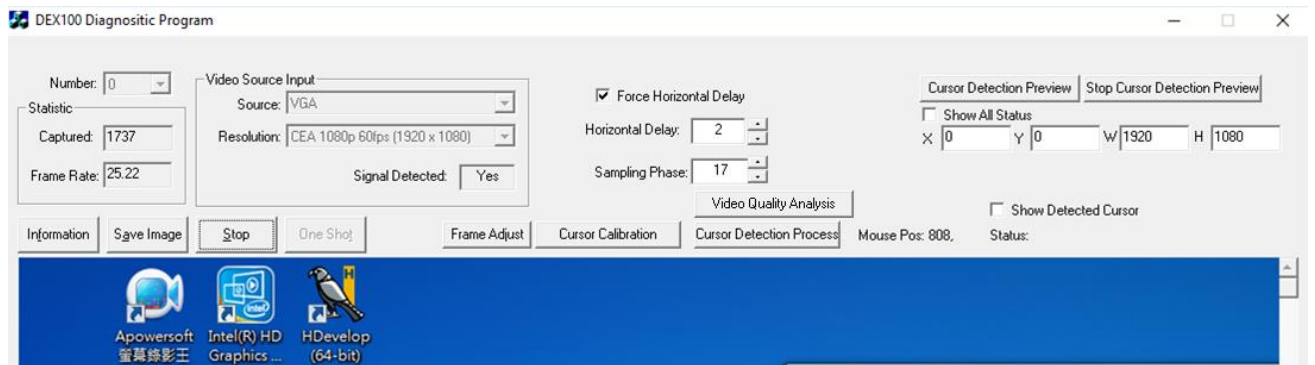
6.6. Cursor Detection Operation

6.6.1. The Brief of Cursor Detection


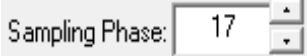
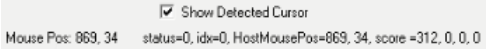
1. Please open Diag.exe program from the DEX-100 SDK install folder.




2. The DEX100 Diagnostic Program Utility shows as below.

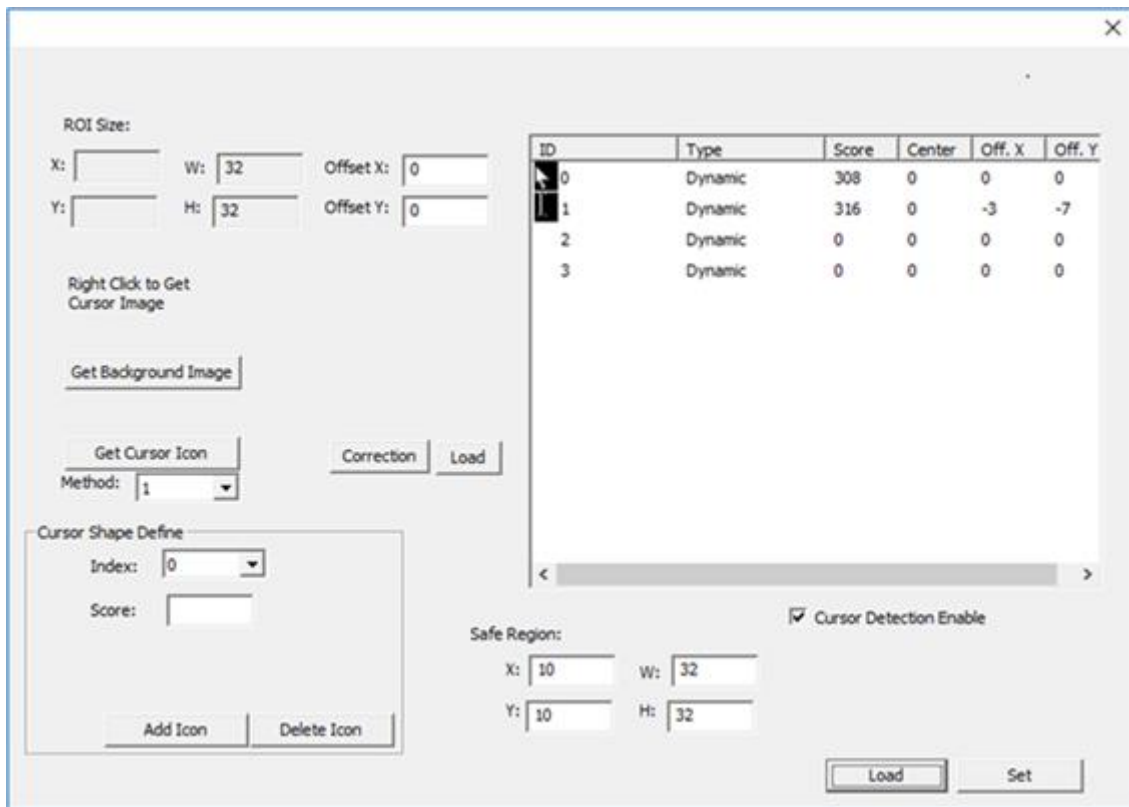


3. The Cursor Detection related components are described as following:

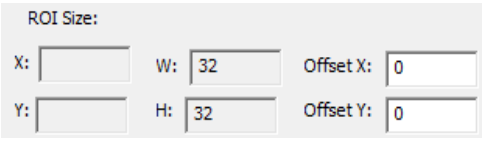
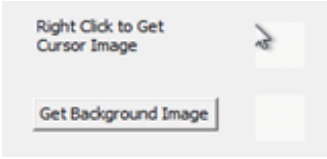

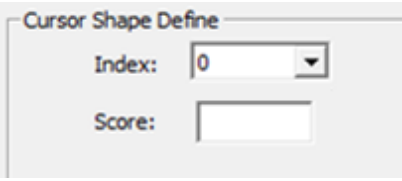

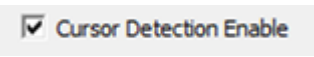

UI component	Descript
	<p>To start or stop capture. when capturing, the DEX-100 moves the host's mouse to the same position as DEX-100's mouse.</p>
	<p>The <i>Sample Phase</i> is about the video quality, please reference “6.2 VGA Sampling Phase Delay Adjustment” for the detail descript.</p>
	<p>The status of the Cursor Detection function:</p> <ul style="list-style-type: none"> ● <i>Mouse Pos</i>: The DEX-100's mouse position. ● <i>Status</i>: The status of Cursor Detection, it may be following values. <ul style="list-style-type: none"> ■ 0 : The DEX-100 finds one mouse cursor. ■ 3 : The DEX-100 finds the same cursor at different position. ■ 4 : The DEX-100 finds more than one cursors at the same time. ■ 5 : The Cursor Detection parameters are loaded. ■ 6 : The Cursor Detection parameters are failed to loaded. ■ 255 : The DEX-100 doesn't find any mouse cursor. ● <i>Idx</i>: The mouse index which is set in Cursor Detection

	<p>Process</p> <ul style="list-style-type: none"> ● <i>HostMousePos</i>: The Host's mouse position. ● <i>Score</i>: The reference value of the max cursor score in the current image. (show in the order of cursor 1, 2, 3, 4) The value is used to help user to adjust the score for each cursor setting, the score set in setting should be lower than the max score then the cursor can be detected. <i>In general case, the max score should be about 310 or above, if the max score is too low, please check the cursor mask or the image quality.</i>
	<p>Open Cursor Detection Process dialog</p>

The Cursor Detection Process Dialog is as following

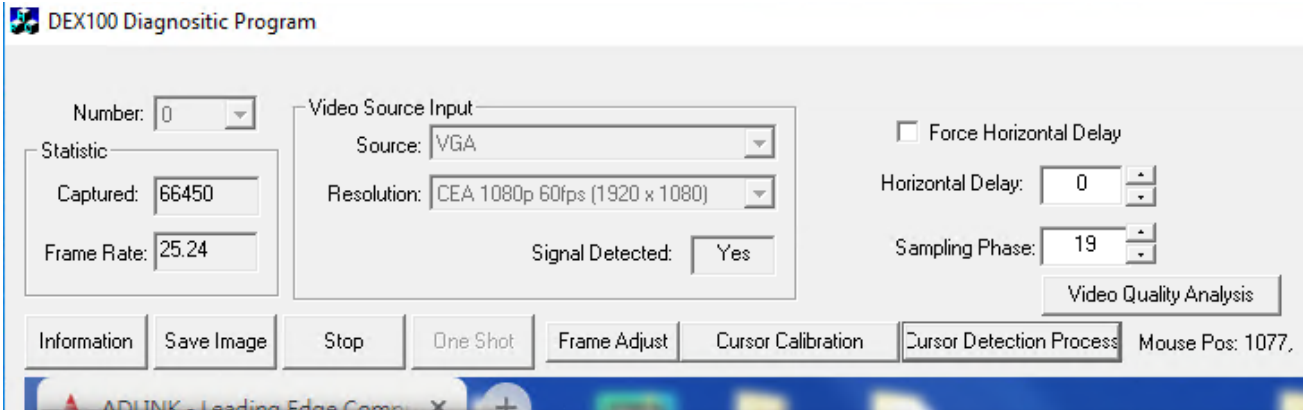


UI component	Descript																														
<table border="1"> <thead> <tr> <th>ID</th> <th>Type</th> <th>Score</th> <th>Center</th> <th>Off. X</th> <th>Off. Y</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Dynamic</td> <td>308</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>Dynamic</td> <td>316</td> <td>0</td> <td>-3</td> <td>-7</td> </tr> <tr> <td>2</td> <td>Dynamic</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>3</td> <td>Dynamic</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </tbody> </table>	ID	Type	Score	Center	Off. X	Off. Y	0	Dynamic	308	0	0	0	1	Dynamic	316	0	-3	-7	2	Dynamic	0	0	0	0	3	Dynamic	0	0	0	0	<p>Shows all the cursor settings, DEX-100 can store 4 cursor types.</p>
ID	Type	Score	Center	Off. X	Off. Y																										
0	Dynamic	308	0	0	0																										
1	Dynamic	316	0	-3	-7																										
2	Dynamic	0	0	0	0																										
3	Dynamic	0	0	0	0																										

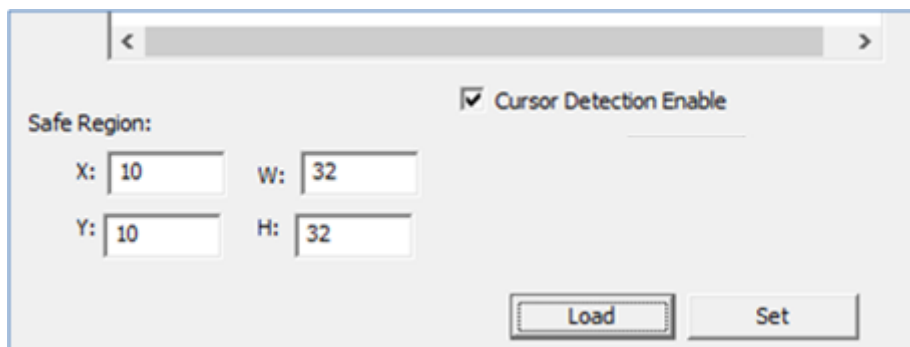
 <p>ROI Size:</p> <p>X: <input type="text"/> W: <input type="text" value="32"/> Offset X: <input type="text" value="0"/></p> <p>Y: <input type="text"/> H: <input type="text" value="32"/> Offset Y: <input type="text" value="0"/></p>	<ul style="list-style-type: none"> ● <i>ROI Size</i> : the host mouse cursor's position, size and offset. ● <i>Offset</i> : The offset of cursor up-left point .DEX-100 detects cursor and reports the position of cursor's up-left point. Adjust the <i>Offset X</i> and <i>Offset Y</i> if the cursor was not at the left and top side of Cursor Image.
 <p>Right Click to Get Cursor Image</p> <p>Get Background Image</p>	<p>The cursor image and background image. DEX-100 uses difference of two images, picture with cursor and without cursor, to recognize the cursor shape.</p>
 <p>Get Cursor Icon</p> <p>Method: <input type="text" value="2"/></p> <p>Correction <input type="text"/> Load <input type="text"/></p>	<ul style="list-style-type: none"> ● <i>Get Cursor Icon</i> : DEX-100 depends on the selected method to cursor icon. ● <i>Correction</i> : to adjust the cursor shape. ● <i>Load</i> : to load the cursor files by choose <i>Cursor_.bmp</i> and <i>CursorMask_.bmp</i> to load the cursor sharp setting.
 <p>Cursor Shape Define</p> <p>Index: <input type="text" value="0"/></p> <p>Score: <input type="text"/></p>	<ul style="list-style-type: none"> ● <i>Index</i> : The index of cursor setting. ● <i>Score</i> : The matching percentage of the score. The range of score is 0 – 320 and we recommend score value as following. (Please reference Make Cursor Patterns Process 8.c and I-Beam Cursor Shape Capturing 3.) <ul style="list-style-type: none"> ■ Arrow : 304 - 308 ■ I-Beam : 314 – 316
 <p>Safe Region:</p> <p>X: <input type="text" value="10"/> W: <input type="text" value="32"/></p> <p>Y: <input type="text" value="10"/> H: <input type="text" value="32"/></p>	<ul style="list-style-type: none"> ● <i>Safe region</i> : an area where the mouse can always be detected. ● When Cursor Detection was enabled but the DEX-100 can't find mouse cursor, the DEX-100 moves the mouse to the safe region and try to find the cursor then continue.
 <p><input checked="" type="checkbox"/> Cursor Detection Enable</p>	<ul style="list-style-type: none"> ● <i>Cursor Detection Enable</i> : Indicates the Cursor Detection function is enabled or not.
 <p>Load <input type="text"/> Set <input type="text"/></p>	<ul style="list-style-type: none"> ● <i>Load</i> : to load the cursor detection setting ● <i>Set</i> : to set the setting to DEX-100.

6.6.2. Make Cursor Patterns Process

1. Press *Cursor Detect Process*.

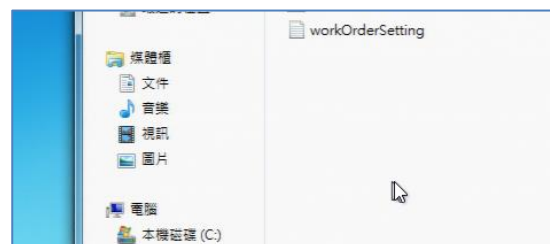


2. Press *Load* to load previous or default configuration.

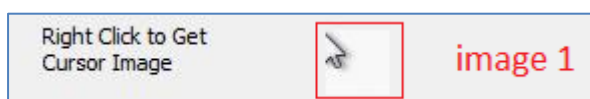


3. Start Diag utility screen capturing.
4. Move the mouse cursor on screen capturing panel and left click mouse to fix ROI left-top position.

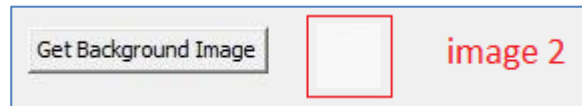
Note: Recommend move the mouse cursor to a place with a simple color background (ex. all white or blue) for the better mouse cursor image



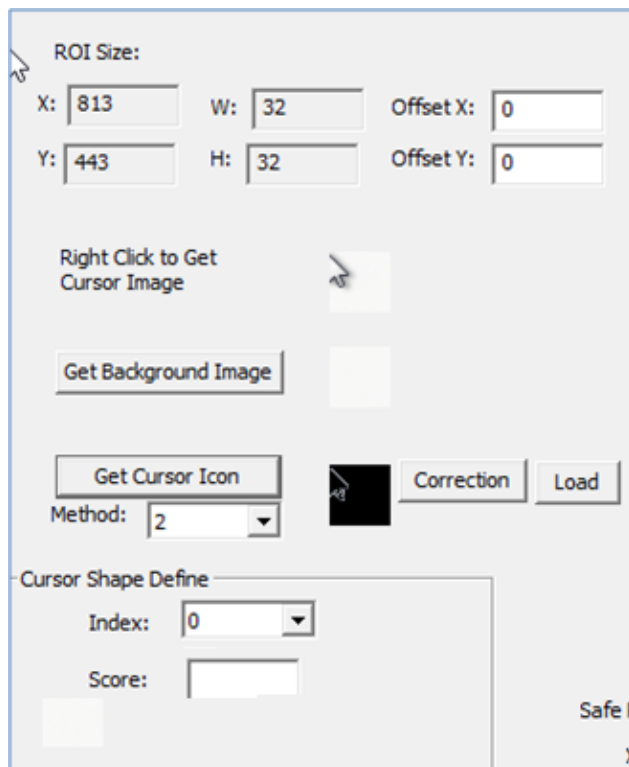
5. Do not move mouse and right click to get image with cursor. (image 1)



6. Move the mouse to another position and press *Get Background Image* on the *Cursor Detection Dialog* to get the background image. (image 2)

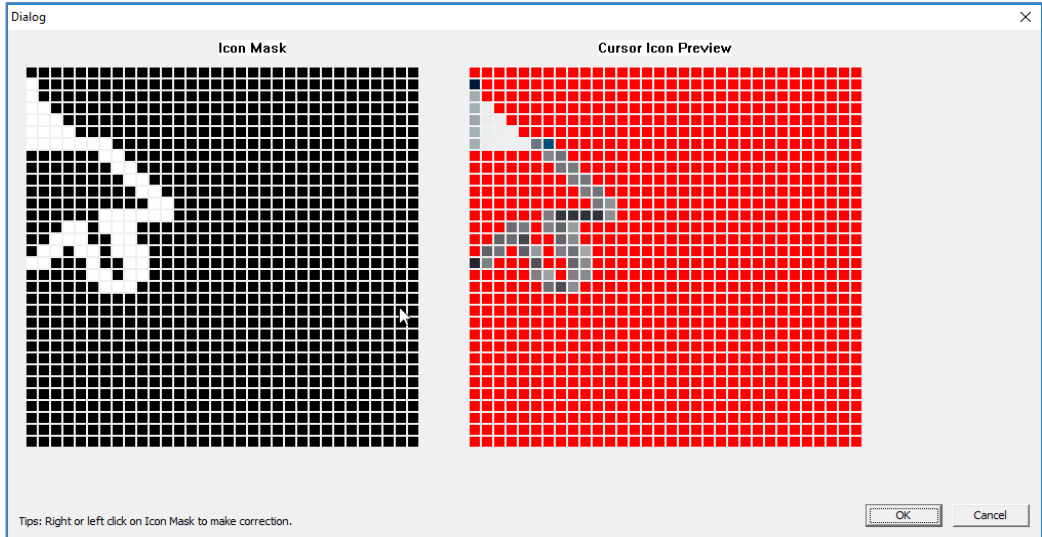


7. The ROI Size indicates the mouse cursor position (X,Y) and the cursor size (W, H).
8. Adjust the *Offset X* and *Offset Y* than repeat step 5 – 7 if the cursor is not at the left and top side of Cursor Image.
9. Press *Get Cursor Icon* procedure to get the first cursor sharp calculating by image 1 and image 2.



Note: There are three methods to get the cursor sharp. For a simple color background (all white or blue etc.), the method one gets a better result, otherwise for a multi colors background please use method 2 or 3 to get the cursor shape.

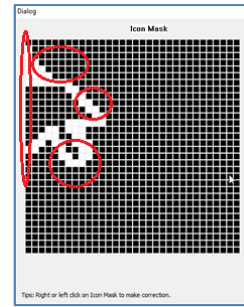
- a) The shape may not be perfect. Please adjust the mask region by left or right click on the Icon Mask and check the result on the Cursor Icon Preview.



Note: The cursor mask is very important for the cursor detection. There are some tips to get a good cursor shape. (please reference to right picture marked with red)

- I. Don't mask the cursor edge line, (ex. dark line in light cursor).
- II. Mask all background and cursor shadow points.
- III. Mask the left edge of the cursor.

b) Below mask is correct cursor detection mask.

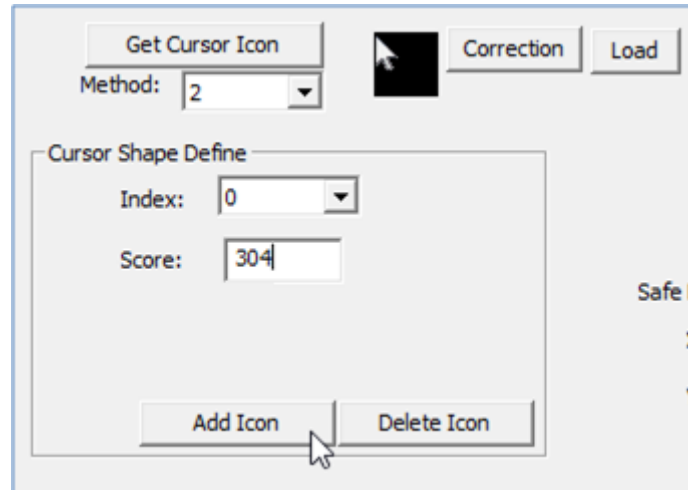


<p>Incorrect cursor detection mask (No cursor edge)</p>	<p>Correct cursor detection mask</p>	<p>Incorrect cursor detection mask (Need to mask the cursor shadow)</p>

c) Set cursor shape score. And press *Add Icon* to add/modify cursor parameters. We recommend Arrow cursor score recommend use **304-308** to get better detect rate.

Note:

The score is a matching percentage of the cursor. The maximum value of the score is 320.



There is not a perfect score value for all machines. Basically, the higher score means the more accurate matching but it also might cause the cursor detection fails to find the cursor. On the other hand, if the score was too low, the cursor detection may find more than one mouse cursor at the same time.

The below table indicates the relation between score and the result of Cursor Detection.

Score	Result	Note
320	The DEX-100 doesn't find the mouse cursor.	
319	The DEX-100 doesn't find the mouse cursor.	
.....	
316	The DEX-100 doesn't find the mouse cursor.	
315	The DEX-100 doesn't find the mouse cursor.	
314	The DEX-100 finds one the mouse cursor.	The score is medium
313	The DEX-100 finds one the mouse cursor.	
.....	
302	The DEX-100 finds one the mouse cursor.	
301	The DEX-100 finds the same cursor at different positions.	
300	The DEX-100 finds the same cursor at different positions.	The score is too low

10. Enable the *Cursor Detection*, set *Safe Region* and *Edge Threshold*.

Safe Region: X: 10 W: 32 Y: 10 H: 32

Cursor Detection Enable

Edge Threshold 60

Load Set

Note:

- I. *Safe region* is used for the cursor detection process. Please find an area where the mouse can always be detected.
- II. *Edge Threshold* is used for the edge recognition. Recommend use 60 to get better detection rate.
- III. The *Move Delay* and *Auto Set* are not used now.

11. Press *Set* to set configuration to DEX-100 machine and close the *Cursor Detection Process Dialog*.

ROI Size: X: W: 32 Offset X: 0 Y: H: 32 Offset Y: 0

Right Click to Get Cursor Image

Get Background Image

Get Cursor Icon Correction Load

Method: 1

ID	Score	Center	Off. X	Off. Y
0	308	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0

Cursor Shape Define: Index: 0 Score: 308

Add Icon Delete Icon

Safe Region: X: 10 W: 32 Y: 10 H: 32

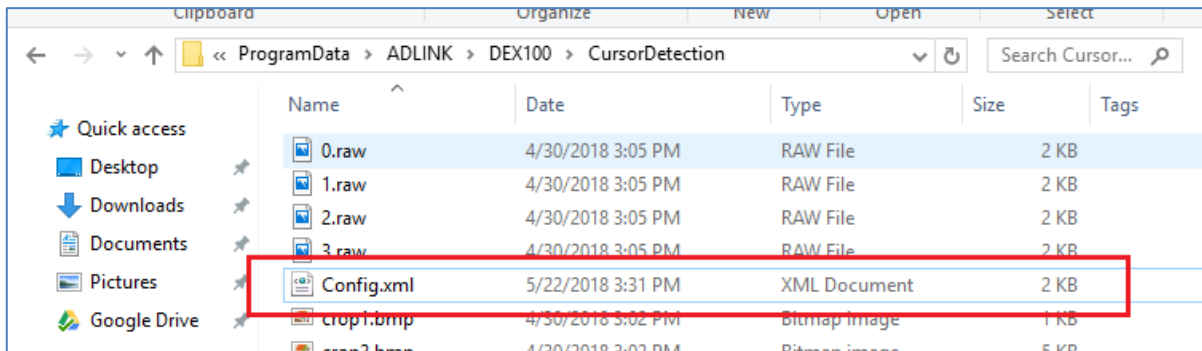
Cursor Detection Enable

Edge Threshold 60

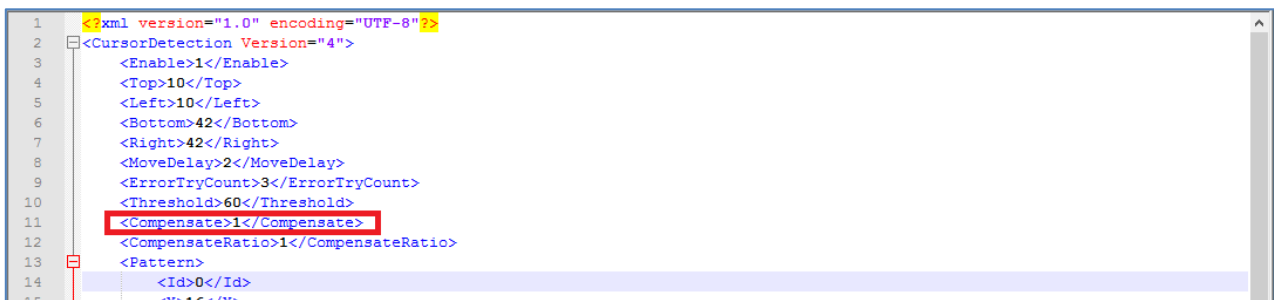
Load Set

12. Please make sure the mouse compensation function is enable by the Config.xml.

1) Open the Config.xml



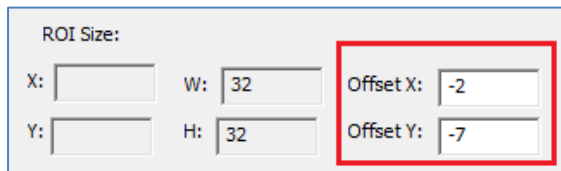
2) Check the Compensate is 1 and save file.



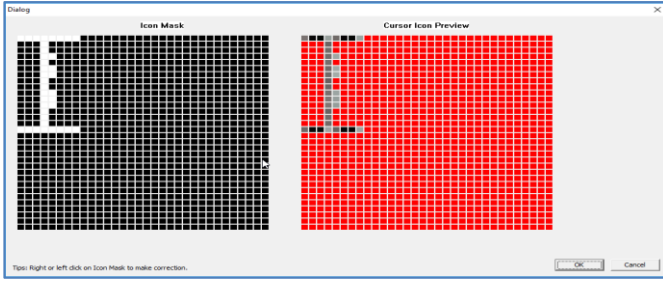
6.6.3. I-Beam Cursor Shape Capturing

1. I-Beam cursor coordination from system report is at middle of cursor image. To capturing the full cursor image, You can adjust the ROI Offset X/Y.

2. Like upper Dialog figure, set the Offset to (-2, -7) to capture full I-Beam image.



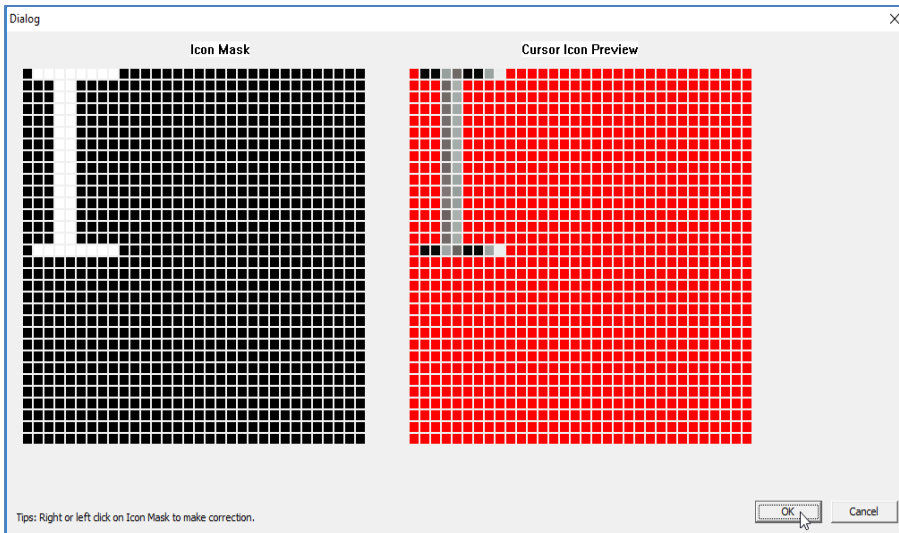
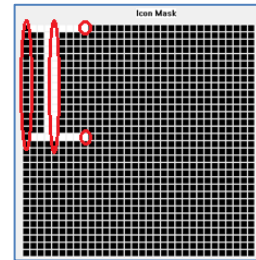
3. Get the shape like bellow figure and adjust the cursor shape.



Note: For the I beam shape adjusting

(Please reference to right picture marked with red)

- I. Extend on pixel column on the middle pillar, top and bottom.
- II. Mask the left edge.



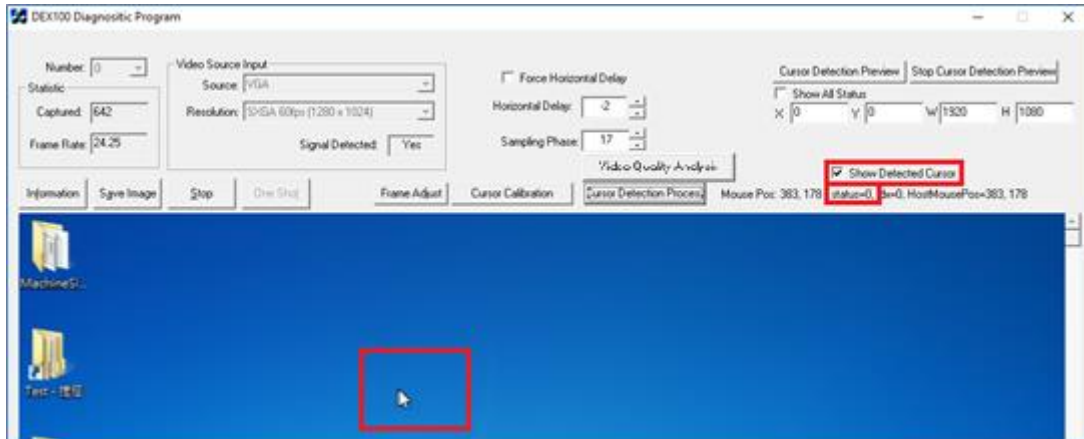
Note: I-Beam cursor score value recommend among **314 - 316** to get better detect rate.

6.6.4. Score Recommendation

Cursor Type	Feature	Mask Method	Recommend Score
Arrow	Thick	<ol style="list-style-type: none"> 1. Include cursor edge. 2. The most Left edge should be masked. 	304-308
I-Beam	Thin	<ol style="list-style-type: none"> 1. Middle pillar pixel right extend on pixel. 2. The most Left edge should be masked. 	314-316

6.6.5. Check the result of Cursor Detection

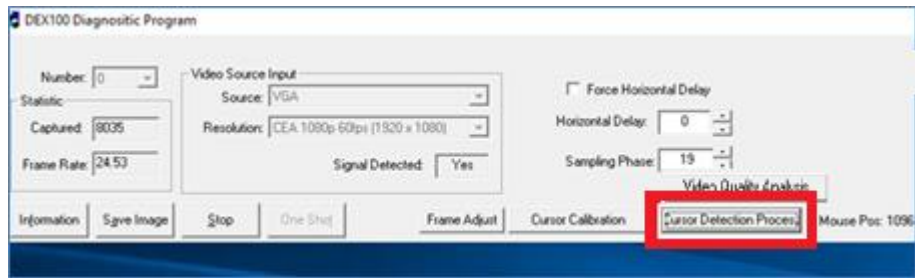
1. Please go the *DEX100 Diagnostic Program Utility* and restart capture to make the Cursor Detection setting work.
2. Enable the *Show Detected Cursor* on *DEX100 Diagnostic Program Utility* and move the mouse on the captured video to check the status of Cursor Detection. The status should be 0 in most positions.



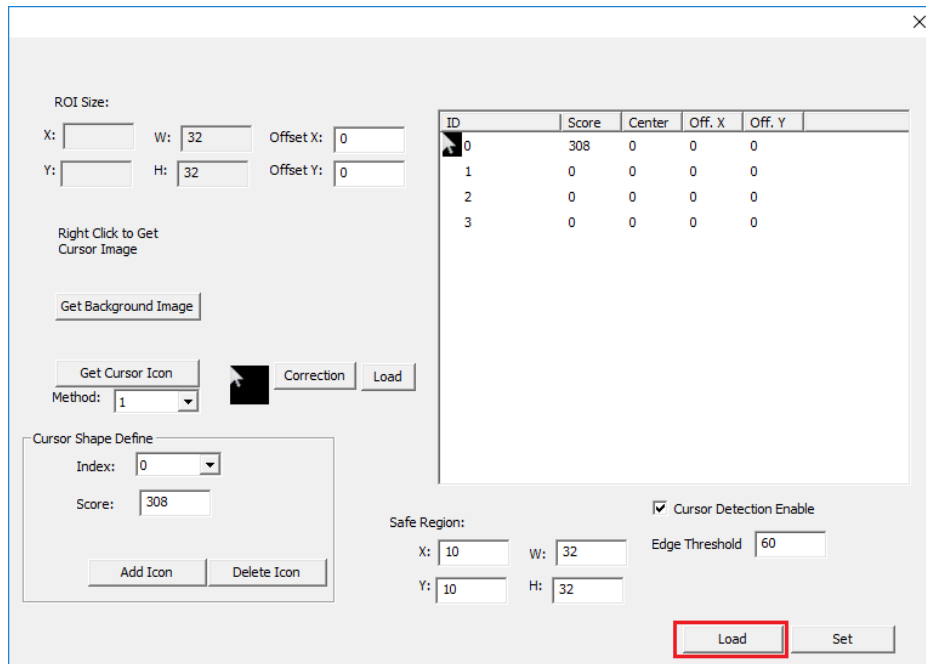
Status	situation	Possible cause and Action
0	The DEX-100 finds one the mouse cursor.	None
3	The DEX-100 finds the same cursor at different position.	The score maybe too low, please adjust the score to higher or adjust the mask.
4	The DEX-100 finds more than one cursors at the same time.	At least one of the score maybe too low, please check the score for each cursor and adjust to higher or adjust the mask.
5	The Cursor Detection parameters are loaded.	None
6	The DEX-100 fails to load Cursor Detection parameters.	The system may be busy, please restart DEX100 Diagnostic Program Utility
255	The DEX-100 doesn't find mouse cursor.	The score maybe too high, please adjust the score to lower or adjust the mask.

3. If the status is often 3, 4 or 255, it means the Cursor Detection does not work well, please adjust the score or check the mask as following steps.

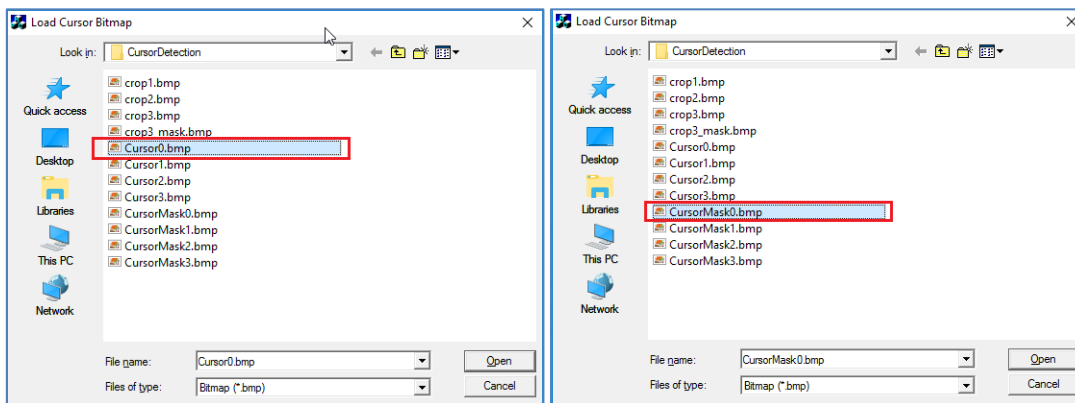
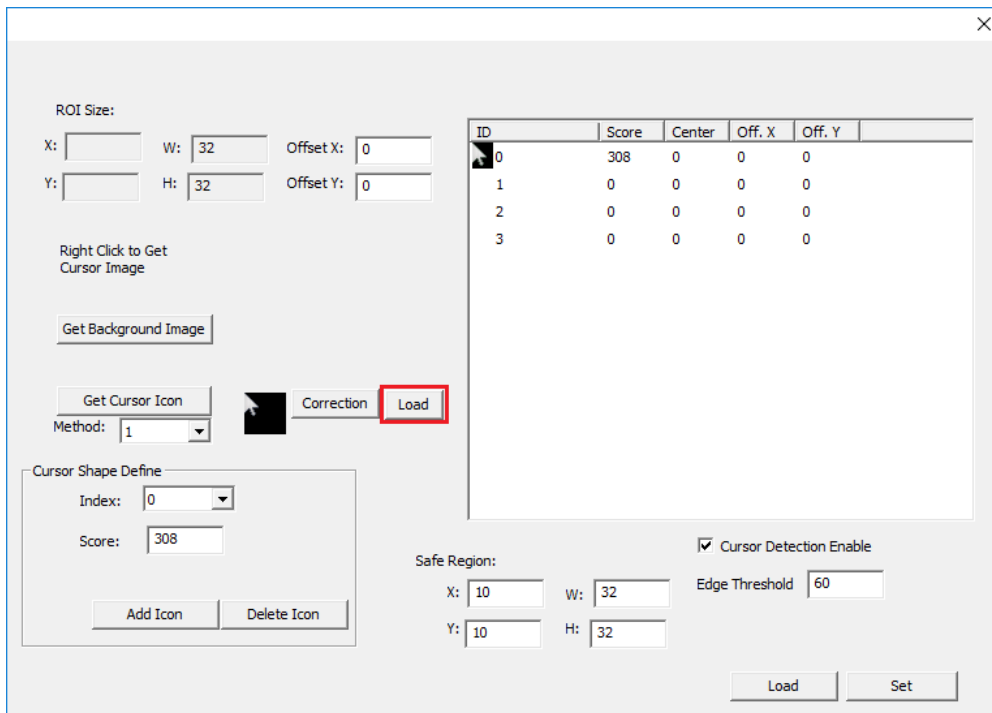
- 1) Press *Cursor Detect Process*.



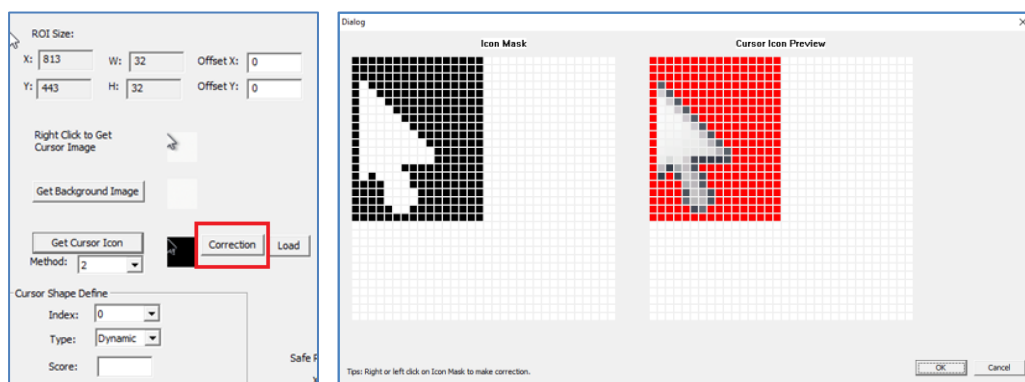
- 2) Press *Load* to load previous or default configuration.



- 3) Press *Load* to load to the cursor files by choose *Cursor_.bmp* and *CursorMask_.bmp* in sequence to load the cursor sharp setting configuration.



4) Press correct to adjust the mask.



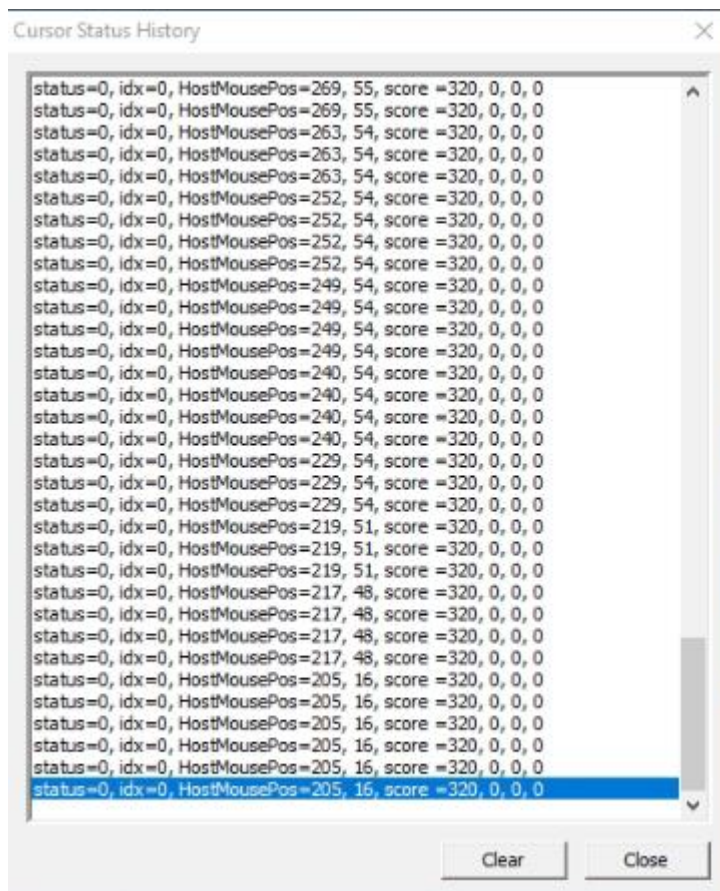
- 5) Depends on the Cursor Detection status and the max cursor score to adjust the score to lower or higher one.
- 6) Select the cursor index and press *Add Icon* to modify Cursor parameter.
- 7) Press *Set* to set configuration to DEX-100. Close the *Cursor Detection Process Dialog* and check the result of *Cursor Detection*.

Note: If the mask and score were all fine, it may be because the video quality is too bad. Please adjust Sampling Phase to optimize the video quality.

- i. Please reference 7.2 VGA Sampling Phase Delay Adjustment for the detail setting of the Sampling Phase.
- ii. If the Video quality change, the OCR library may need to be training again to adapt the word in the new video displayed.

6.6.6. The History of Cursor Status

Add the history of cursor status information. In ideal case it should larger than 310.

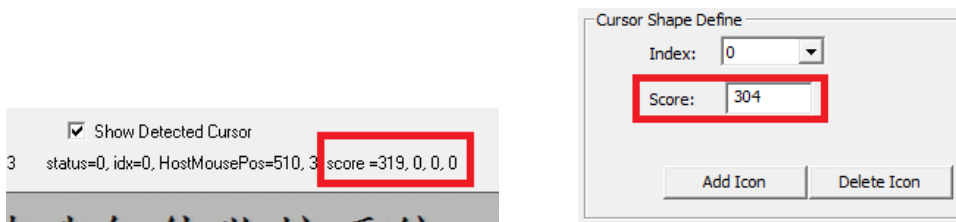


Score of cursor detection status	Note	Action
Score < 300	The DEX-100 can't find the cursor in the image or it finds the cursor but the similarity is very low.	User may need to adjust the cursor mask or adjust the sampling phase to improve the video quality.
300 <= Score < 310	The DEX-100 finds the cursor in the image but the similarity is not good enough. The cursor detection still works	We suggest user review the cursor mask or adjust the sampling phase to improve the video quality.

	if user set a low score in Cursor Shape Define.	
310 <= Score	The DEX-100 finds the cursor in the image and the similarity is good.	

Note.

DEX-100 compares these two scores and finds the cursor if the score of cursor detection status is larger or equal to the score in Cursor Shape Define.



Score of cursor detection status v.s. Score in Cursor Shape Define.

Condition	Note
Score in cursor detection status < score in Cursor Shape Define.	DEX-100 can't find the cursor.
Score in cursor detection status >= score in Cursor Shape Define.	DEX-100 finds the cursor

6.6.7. Pre-Scan the status of Cursor Detection

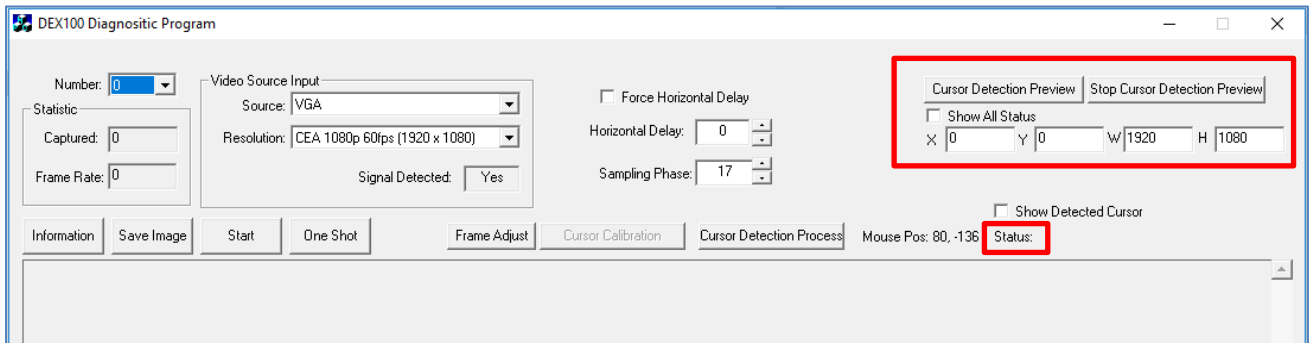
If you already set up the cursor detection, you can pre-scan every pixel on the Diag.exe. We will show how to use step by step as follows.

1. You have to set the X, Y, W and H to decide what scope you want to confirm the status
2. If you check Show All status, it will show all the status included the status 0 (succes). Or you will only get the status not equal to 0, it may be (1,2,3,4,7)

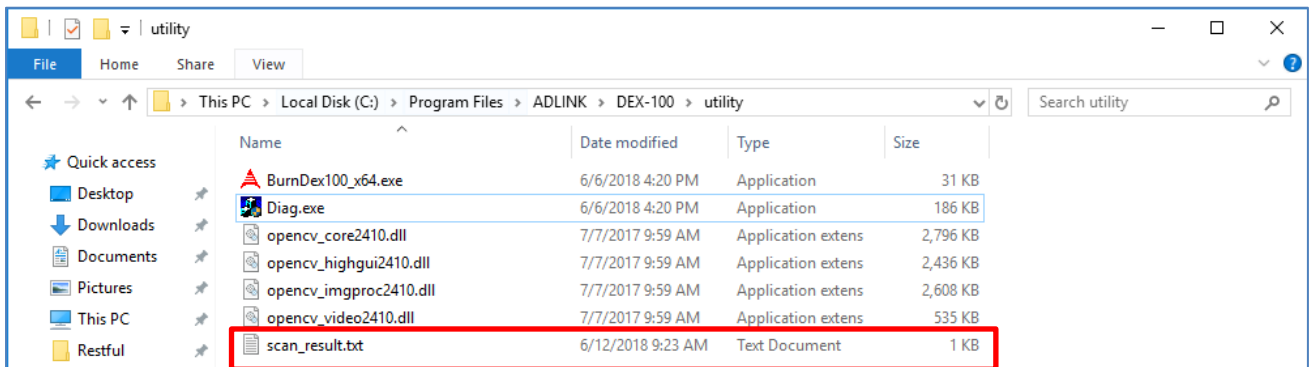
ID	Status	Description
0	SUCCESS	No error occurs
1	ERROR_CANNOT_DETECT	Mouse could move to safe region and detected, but cannot detect in move function position
2	ERROR_CANNOT_CONTROL	Cannot control mouse to safe region
3	WARNING_MULTI_POS	Single cursor match but has multi position
4	WARNING_MULTI_CURSOR	Multiple cursor patterns detected
5	CURSOR_DETECT_LOAD	Driver had load the cursor detection

6	CURSOR_DETECT_FAIL	Driver does not load cursor detection
7	CURSOR_LOSE_PRECISION	Cursor can control but it position is not at defined position
8	CURSOR_POSITION_LOST_IN_EDIT_MODE	Cursor cannot find in EDIT control mode.

3. Click the “Cursor Detection Preview” to start



4. It will show the scanning result on “Status” every pixel and generate the result on the C:\Program Files\ADLINK\DEX-100\utility\scan_result.txt



6.6.8. Cursor Detection in DEX-Pro

Before you start the cursor detection function, you have to check as follows.

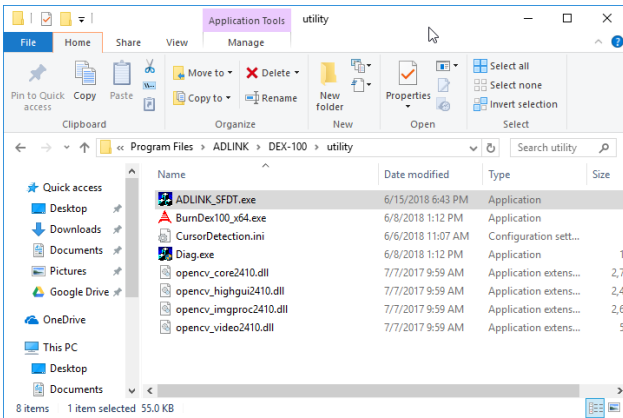
1. Set up the cursor pattern (Section 6.6.1~6.6.5)
2. Set the cursor detection enable or disable and cursor detection re-try times (Chapter 3. Toos Menu)
3. Any mouse command to enable the cursor detection (Chapter 5.Script Command – Mouse commands)

In running mode, there are 3 status to force to stop the script, and they are status 1, 2, 7. You can refer the table in previous section (6.6.6). And any cursor detection and script step stopping log will be record on the C:\Program Files\ADLINK\DEX-100\main\Dex-100\Logs.

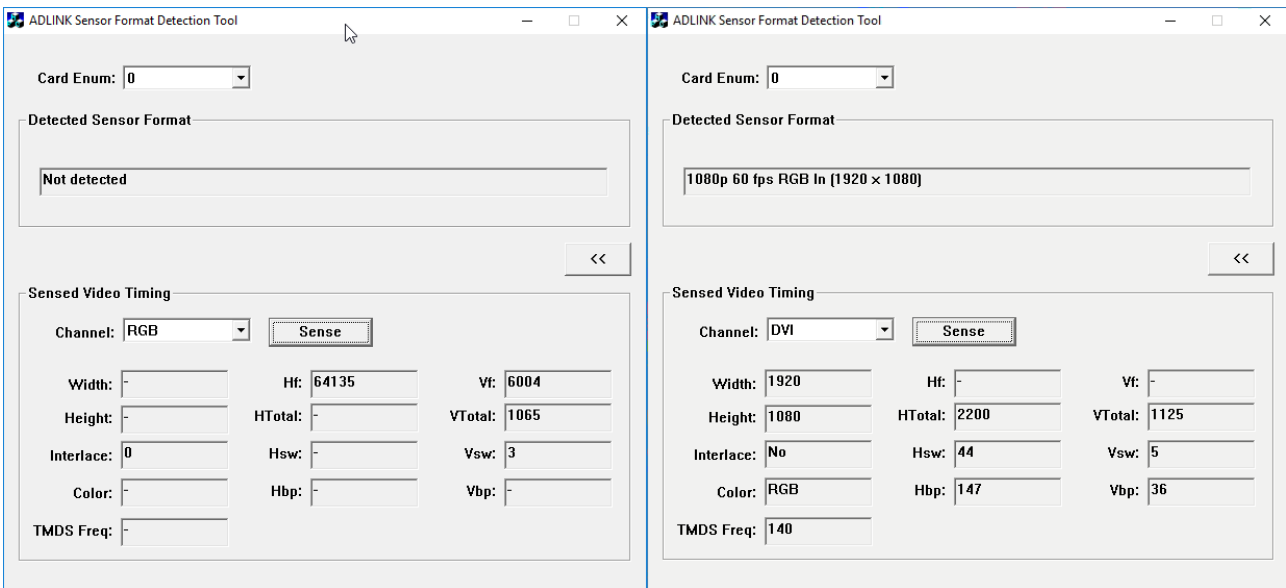
6.7. Configuring Unsupported Resolution

When the DEX-pro can't detect the inputs video resolution and fails to capture image form machine. User may need to reports the video timing to ADLINK. This chapter indicates how to get the video timing of unsupported resolution.

1. Open the ADLINK Sensor Format Detection Tool. (ADLINK_SFDT.exe)



2. Select the Video Channel (VGA or DVI) and press Sense



3. Provide the resolution, fps and all the video timing values that are read from the tool and send back them to ADLINK.

4. ADLINK returns a new text file for the new resolution.

The VGA resolution list is stored in dex-100_rgb.txt. The DVI resolution list is stored in dex-100_hdmi.txt.

5. Paste and replace the text file in C:\Windows and restart the driver.

6.8. OCR Error Handling on Char/ Digit

Owing to the new OCR replacement mechanism, we provide a check OCR result on Char/Digit for other OCRs. It is similar with ADLINK Table on original version, but it will remove the replacement on table mapping. Its main purpose is providing the log mechanism to help user get the error word include the character index, original setting format, returned character and ROI ID information. Besides the ROI images will be saved, users can map the log information and get the corresponding ROI images to feed the OCR training or analysis.

GUI:

It is the same as Adlink Table checkbox to enable this function or not. If the tesseract OCR is enable in machineini.ini, it will switch to tesseract OCR and the Adlink Table will be performed for above function.

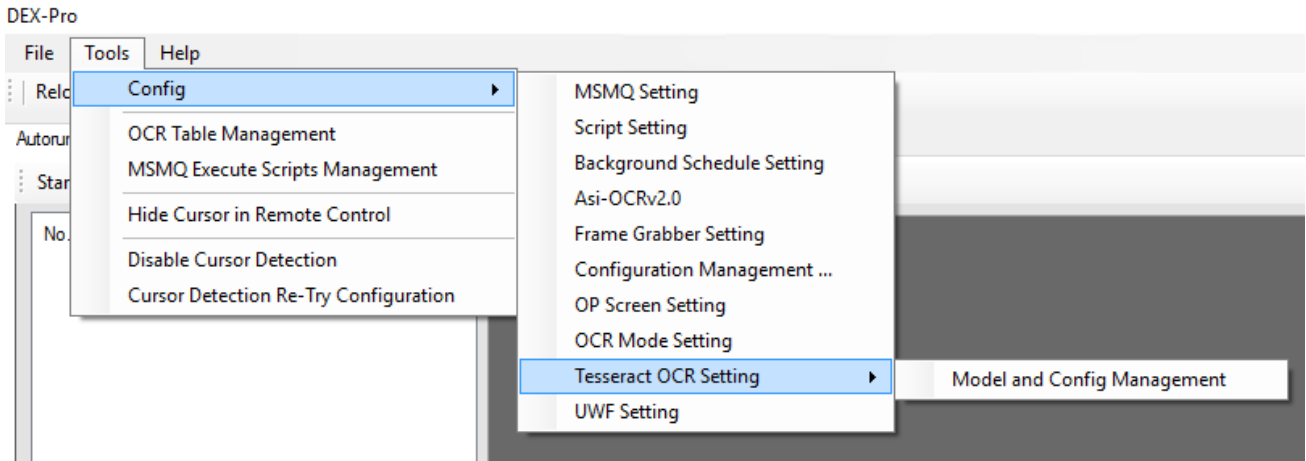
Log Format & Path:

- ROI Image
 - ROI saving picture path: C:\New_OCR_ROI_IMG\
e.g: C:\New_OCR_ROI_IMG\
 - ROI image file name: ImageLayer + ROIImage + ROIID + '_' + year + '-' + month + '-' + day + '_' + hour + ':' + min + ':' + sec + .bmp
(ImageLayer-ROIImageID_yyyy-MM-dd_HH.mm.ss.bmp) (To avoid the different image layer has the same ROI ID)
e.g: getimg_001-ROIImage6_2018-08-30_12.00.00.bmp
- Log
 - Tesseract log path: C:\Program Files\ADLINK\DEX-100\main\Dex-100\OCR\
 - Tesseract log file name: logfile.txt
 - Tesseract log format: OCR error- ROI ID:(ROIID) ,Check char:(check returned OCR char) , index:(char index in word) , ori: (original user setting format)
e.g: OCR error- ROI ID:8, Check char:e, index:1, ori: N, User set the second char format is 'N', but returned value is 'e' (it is the l format - lowercase char)

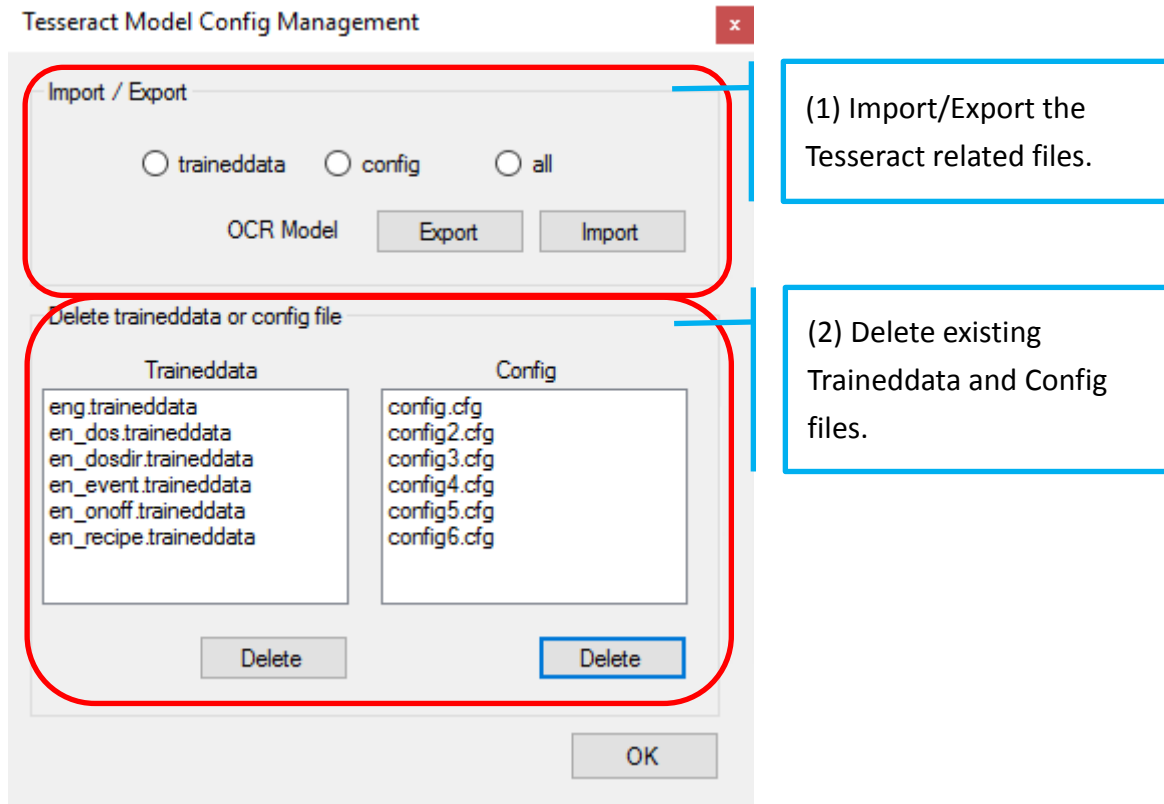
6.9. Tesseract 3.05 Functionality

Owing to the Tesseract 3.05 new OCR mechanism, we provide two important features for enhancement on the DEX-Pro. One is the confidence level to provide user a threshold to decide the OCR result keep or not. It not only providing the average of all characters but also checking the minimum of the choosing characters. Other is adding the resizing image algorithm on the interpolation and super resolution when the image is too small to impact the OCR result. Besides the confidence level and pre-processing (resizing image), it enhances on whitelist which user can input characters to let the OCR result only in the specific configuration set.

GUI:



When you set the OCR Mode = 1, the OCR will change to Tesseract 3.05 and the “Model and Configuration Management” item will be visible.



This management includes two parts: (1) Import/Export the Tesseract related files; (2) Delete existing Traineddata and Config files.

(1) Import/Export the Tesseract related files

Use Export or Import button to save or include your own Tesseract related files. There are three options are provided. You can import/export the “traineddata” or “config” only. Or you can both import/export the “traineddata” and “config”. Notice that if the “traineddata” and “config” import or export, the metadata file will also be import/export.

(2) Delete existing Traineddata and Config files.

There you can delete the “Traineddata” or “Config” files separately. Notice that your deletion will

affect all set metadata files of the current Tesseract ROI settings.

● Tesseract OCR settings:

After choosing the target ROI (see the red Rectangle below marked as 0), you can start to set the Tesseract related parameters after pressing the “Add OCR” button frame selected as green color.



After you pressed the “Add OCR”, ROI #(here represents your ROI number) setting form showed up, See the picture below. You can select an existing setting or you can create your own setting by pressing the “new” button.

1. Select an existing setting: Select the existing ROI setting in the “Existing ROI Settings” panel. After you chosen an existing setting, you can preview it by “Preview” button. There will show each properties of this setting in the “Content Viewer” form.

ROI 0 Setting

Existing ROI Settings

- eng+en_event+en_recipe_config5.cfg_35f
- eng+en_dosdir_config2.cfg_8be21d8c8ae
- eng+en_dosdir+en_onoff_config4.cfg_969
- eng_config3.cfg_9789df33e8704f379c3ac
- eng+en_dos+en_dosdir+en_event_config4

Preview

OK

Delete Selected

New

Preview the selected setting.

You can select an existing setting.

You can create a new setting in need.

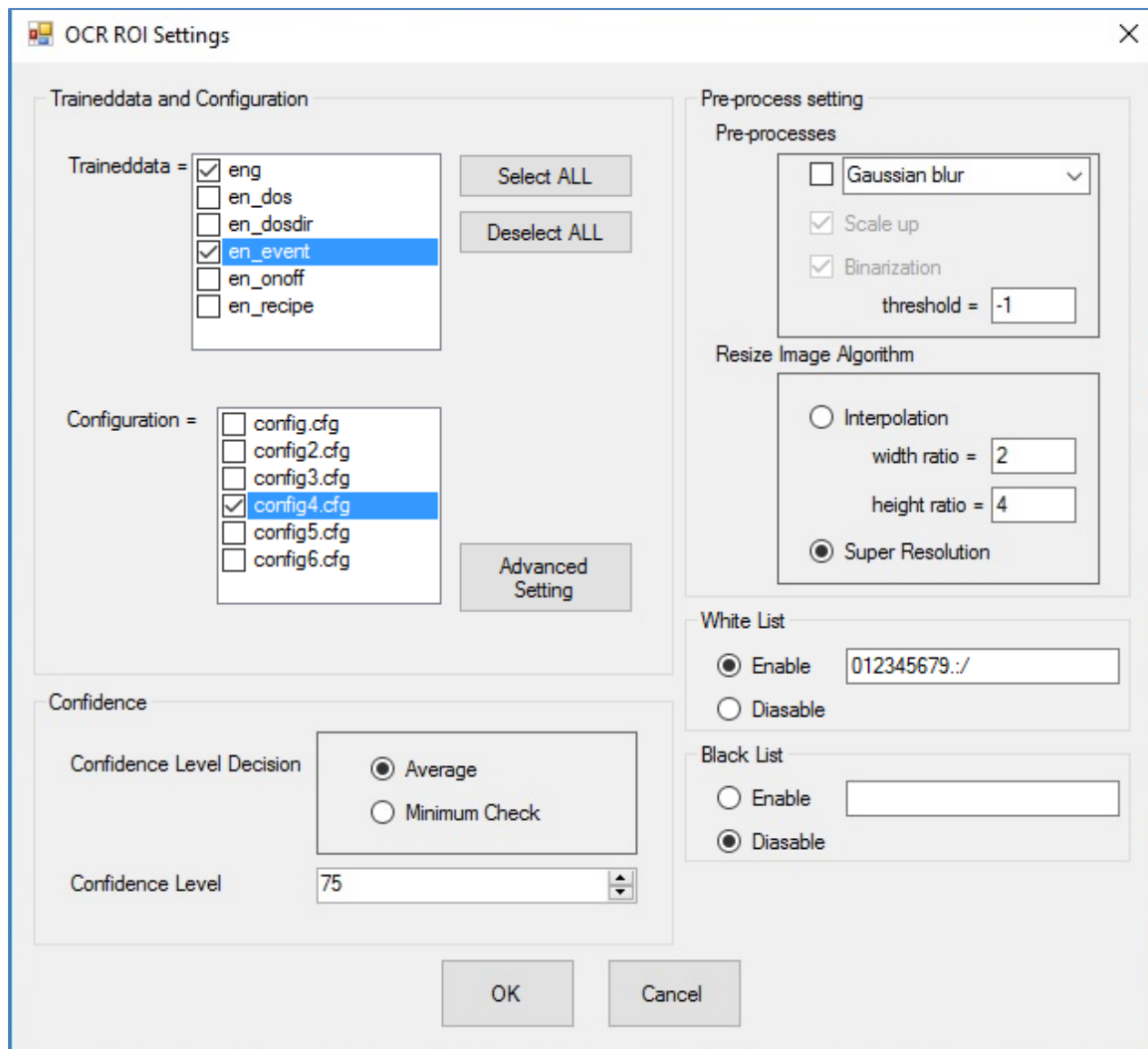
You can delete an existing selected setting above.

Content Viewer

Confidence	
ConfidenceLevel	55
ConfidenceLevelDecision	MinimumCheck
Image Preprocessing	
PreProcessing	GaussianBlur, ScaleUp, Binarization
List	
BlackList	Tesseract.TessROI+SpecialOCRList
WhiteList	Tesseract.TessROI+SpecialOCRList
Resize Algorithm	
ResizeAlgorithm	Interpolation
Tesseract and Configuration	
ConfigurationName	config5.cfg
TraineddataName	eng+en_event+en_recipe
Width/Height Ratio	
ResizeRatio	Tesseract.TessROI+InterpolationRatio

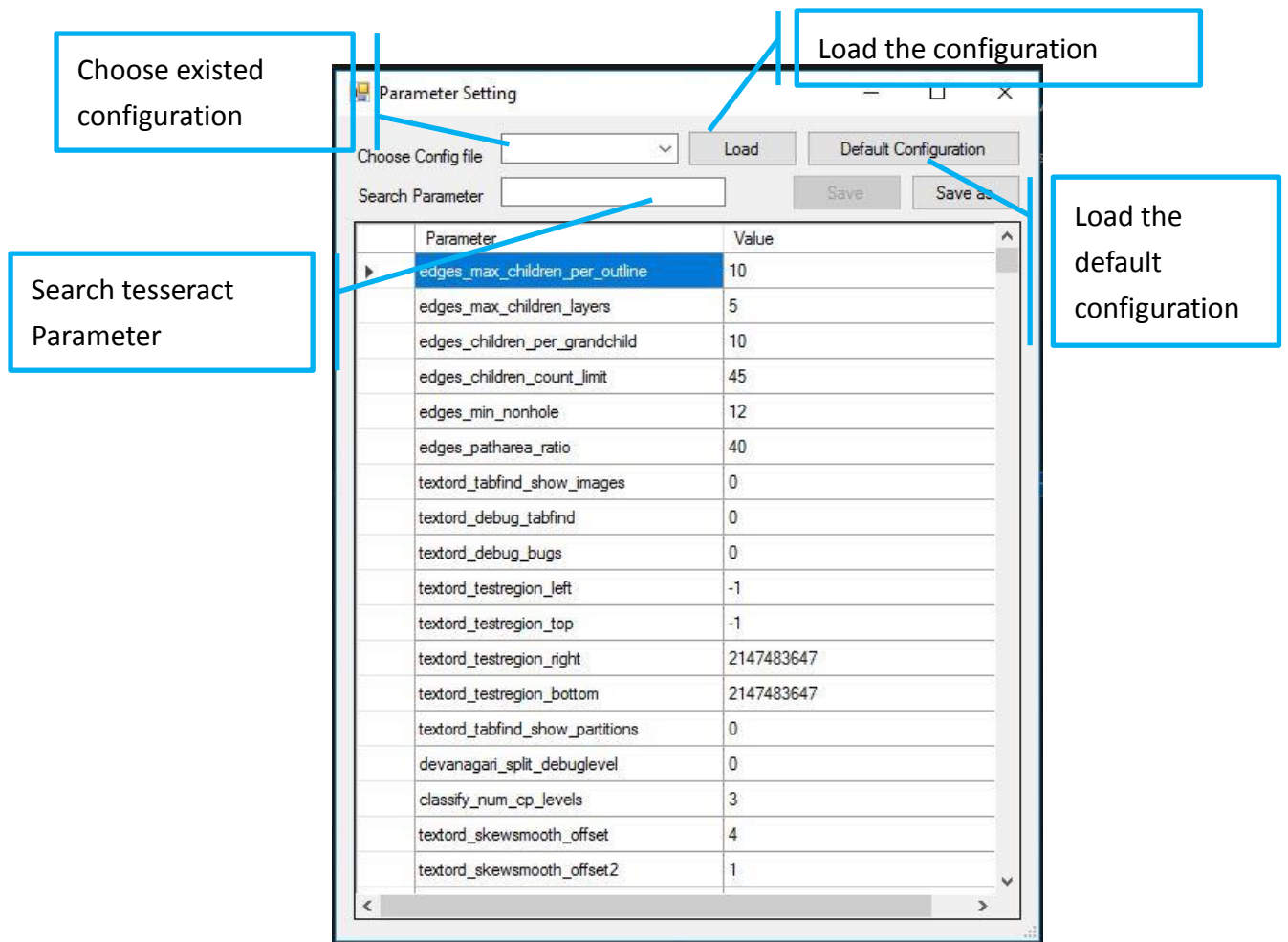
ConfidenceLevel
Confidence Level

2. Create a new setting: If there's does not exist a proper setting, you can create a new setting to meet your requirements. Press the "new" button and the "OCR ROI Settings" form will show.



Traineddata and Configuration:

- i. Choose the Tesseract traineddata (multiple selection). The Select/Deselect All button can let you quickly edit.
- ii. Choose the configuration (single selection). Press the Advanced Setting button for Tesseract advanced settings if required as follow. For the more parameters information in detail, you have to refer the tesseract from google.



Confidence:

There are two choices on the “**Confidence Level Decision**”.

- Average: It will let the user-defined confidence level value compare with the truly tesseract confidence level average value. E.g. Test, T:80, e:60, s:70, t:80, the average confidence value is $(80+70+90+80)/4 = 80$, this value compare the user-defined confidence value 100 as the picture
- Minimum Check: It will let the user-defined confidence level value compare with the truly tesseract confidence level every character choosing value. E.g. Test, T:80, e:60, s:70, t:80, every value compare the user-defined confidence value 100 as the picture

Confidence Level: This is user-defined confidence level value, if the value is higher than truly tesseract confidence level value, the returned string is shown on “Not Recognition” and record the every character confidence level value (possibility value) in the log, truly recognition value and save the error ROI image on .tiff format. The more detail for the log description and image information is in the next section.

Pre-Process setting:

There will include some image processing options for user, this is considering to increase the accuracy of the tesseract OCR recognition result:

Pre-processing: You can select the preprocessing using on the ROI image. There are three options: Gaussian Blur, Scale up and Binarization. The Scale up and Binarization are enforced to use for more accurate OCR result. For the Binarization, setting -1 is auto-calculate the best value. Otherwise, the value interval is between 0~255 by manually setting. The preview image is saved on the C:_.

Resize Image Algorithm: This is the resizing image algorithm for user setting. It will operate when the image height is lower than 33 pixels. It will increase the OCR accuracy. Besides, it will help user get the error ROI on the twice image. If you select the Interpolation, you can set the ratio of width and height. Super resolution does not provide the size settings cause the designed algorithm.

White List:

It provides whitelist to let you set the specific characters to recognize. E.g. If you check the enable radio button and input the 0123456789,;/, the OCR result characters will only restricted in the characters set. The image character “O” will force to change to “0” character because of the configuration set [0123456789,;/] is only included the “0” and excluded the “O”

Black List:

It provides black list to let you set the specific characters to exclude on the recognition. E.g. If you check the enable radio button and input the 0123456789,;/, the OCR result characters will be recognized and excluded in the characters set. The image character “O” will force to change to other character like “0” or “o” but it never to recognize to “0” character because of the configuration set [0123456789,;/] is only excluded the “0”.

Log Format & Path:

- ROI Image
 - ROI saving picture path: C:\TESS_ROI_IMG\
e.g: C:_TESS_ROI_IMG\
■ ROI image file name: ImageLayer + ROIImage + ROIID + ‘_’ + year + ‘-’ + month + ‘-’ + day + ‘_’ + hour + ‘:’ + min + ‘:’ + sec + .bmp
(ImageLayer-ROIImageID_yyyy-MM-dd_HH.mm.ss.bmp) (To avoid the different image layer has the same ROI ID)
e.g: getimg_001-ROIImage6_2018-08-30_12.00.00.bmp
- Log
 - Tesseract log path: C:\Program Files\ADLINK\DEX-100\main\Dex-100\log\
■ Tesseract log file name: logfile.txt
■ Tesseract log format:
Result: [OCR Result], confidence level : [truly tesseract confidence level value] lower than user input value: [user-defined confidence level value]
Confidence Level Info: symbol:[chosed character], conf:[chosed character confidence level value] [possible character 1], conf: [possible character 1] [possible character 2], conf:

[possible character 2] and etc. /// (end of the 1st character)

e.g: Result:Itudio Code,confidence level:85 lower than user input value:100

2018-09-18 10:51:17.9493 | INFO | Script | Confidence Level Info:

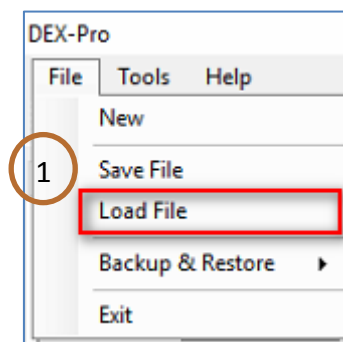
symbol:l,conf:91.562378 [l],conf: 91.562378 [l],conf: 91.389709 ['],conf: 90.687805 [],conf: 90.467407/// symbol:t,conf:72.610962 [t],conf: 72.610962 [fi],conf: 58.036041/// symbol:u,conf:94.302422 [u],conf: 94.302422 [U],conf: 87.742798/// symbol:d,conf:82.956841 [d],conf: 82.956841/// symbol:i,conf:88.855942 [i],conf: 88.855942/// symbol:o,conf:86.132683 [o],conf: 86.132683 [O],conf: 83.588768 [O],conf: 81.331100 [c],conf: 75.669678 [Q],conf: 74.847641 [G],conf: 74.397995 [U],conf: 73.761749 [a],conf: 73.737335 [e],conf: 73.519440/// symbol:C,conf:85.817001 [C],conf: 85.817001 [€],conf: 71.201958 [c],conf: 70.844307/// symbol:o,conf:83.627655 [o],conf: 83.627655 [O],conf: 81.249893 [O],conf: 79.682175 [D],conf: 76.442062 [Q],conf: 76.253937 [c],conf: 72.360229 [U],conf: 72.203735 [G],conf: 72.166687 [e],conf: 72.152779 [a],conf: 70.793457/// symbol:d,conf:82.522148 [d],conf: 82.522148/// symbol:e,conf:86.857246 [e],conf: 86.857246 [a],conf: 76.896622 [&],conf: 75.992401 [E],conf: 73.676300///

Press OK if all the settings are ready, the new setting will default selected in Existing ROI Settings of ROI Setting form. Also you can preview it and finish this ROI setting by the “OK” button.

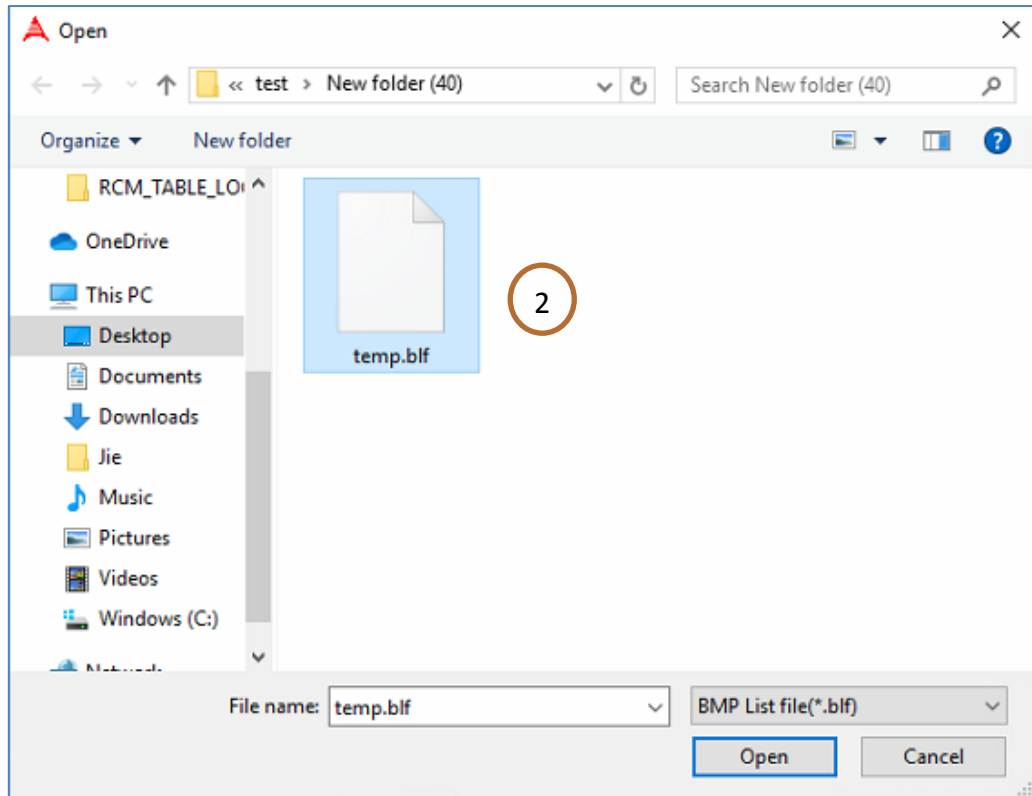
● Tesseract OCR management:

This function provides the setting the tesseract configuration for ROI items, and we show how to use it as follow.

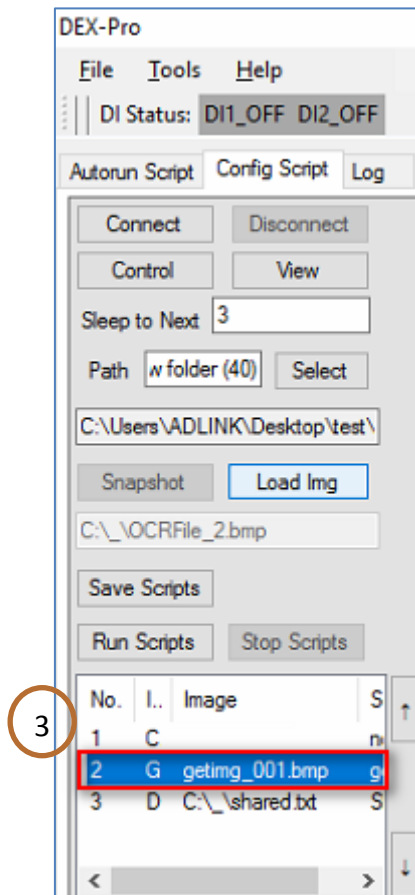
1. Click File→Load



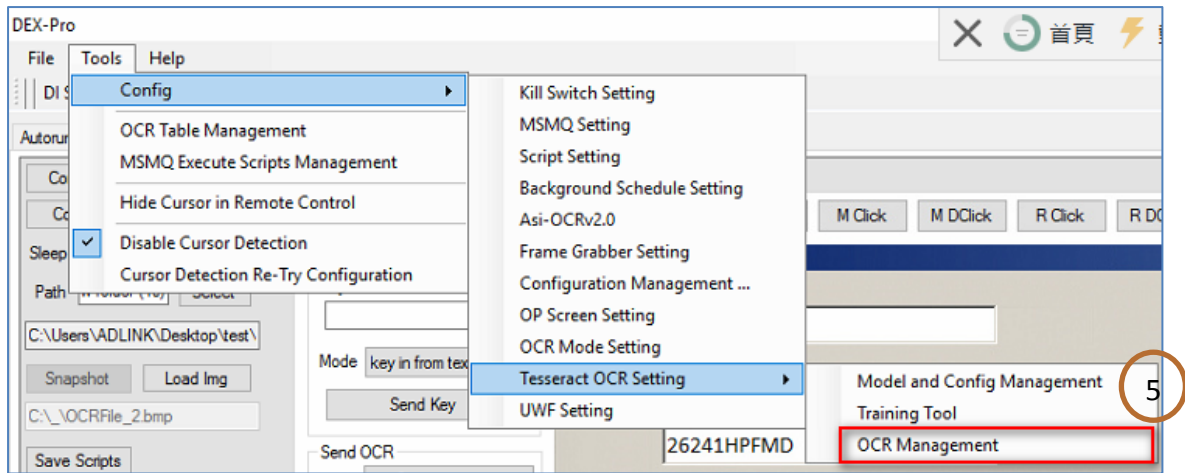
2. Choose the .blf file



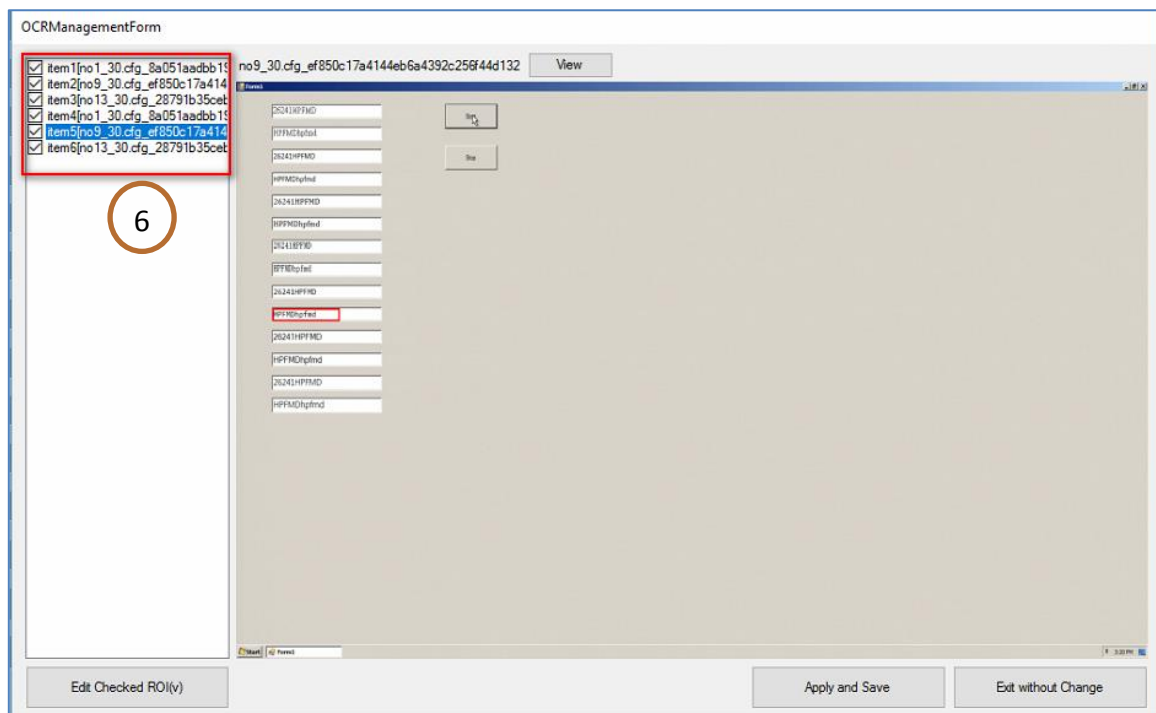
3. Click the image layer



4. Click the Tools→Config→Tesseract OCR Setting→OCR Management



5. Choose the left ROI data (Support multiple choices)

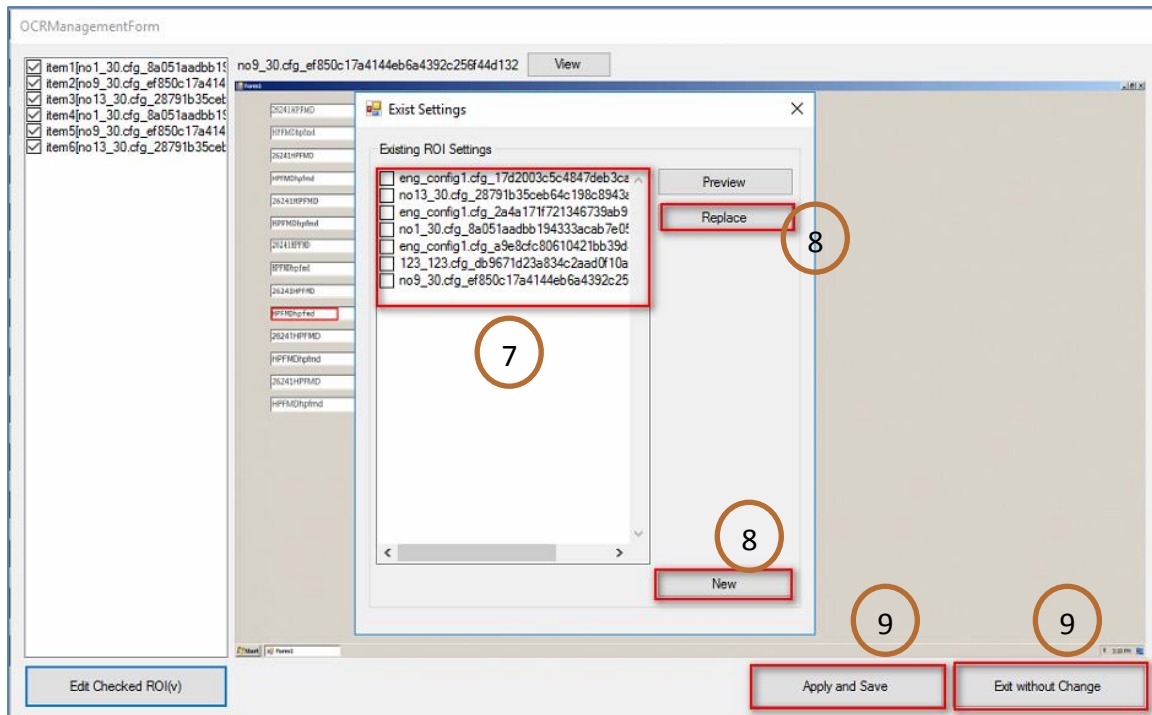


6. Edit Checked ROI

- 1) Choose the other setting configuration
- 2) Click the Replace

Or

- 1) Choose the other configuration data
- 3) Click the New to create new setting configuration (Refer to previous section)

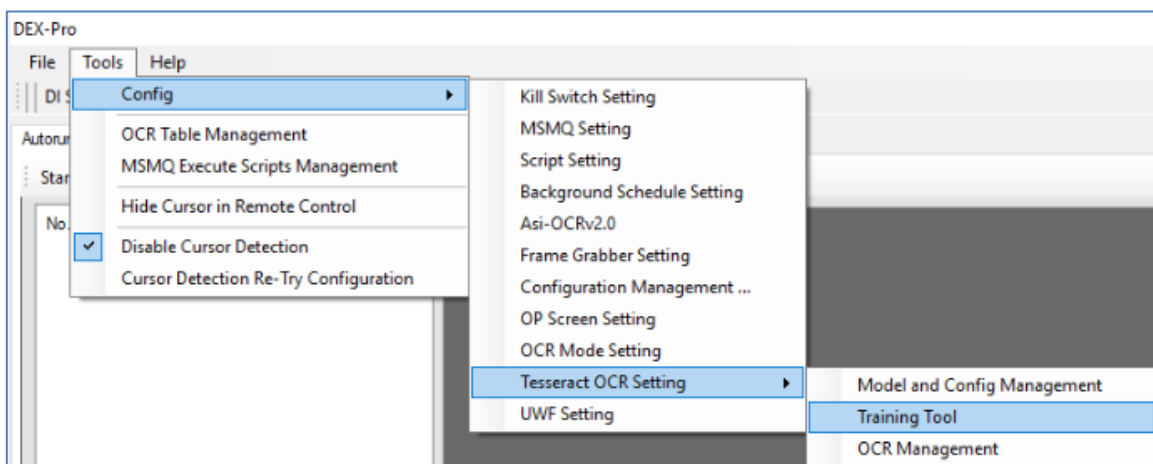


7. Click “Apply and Save” or “Exit without Change” to complete

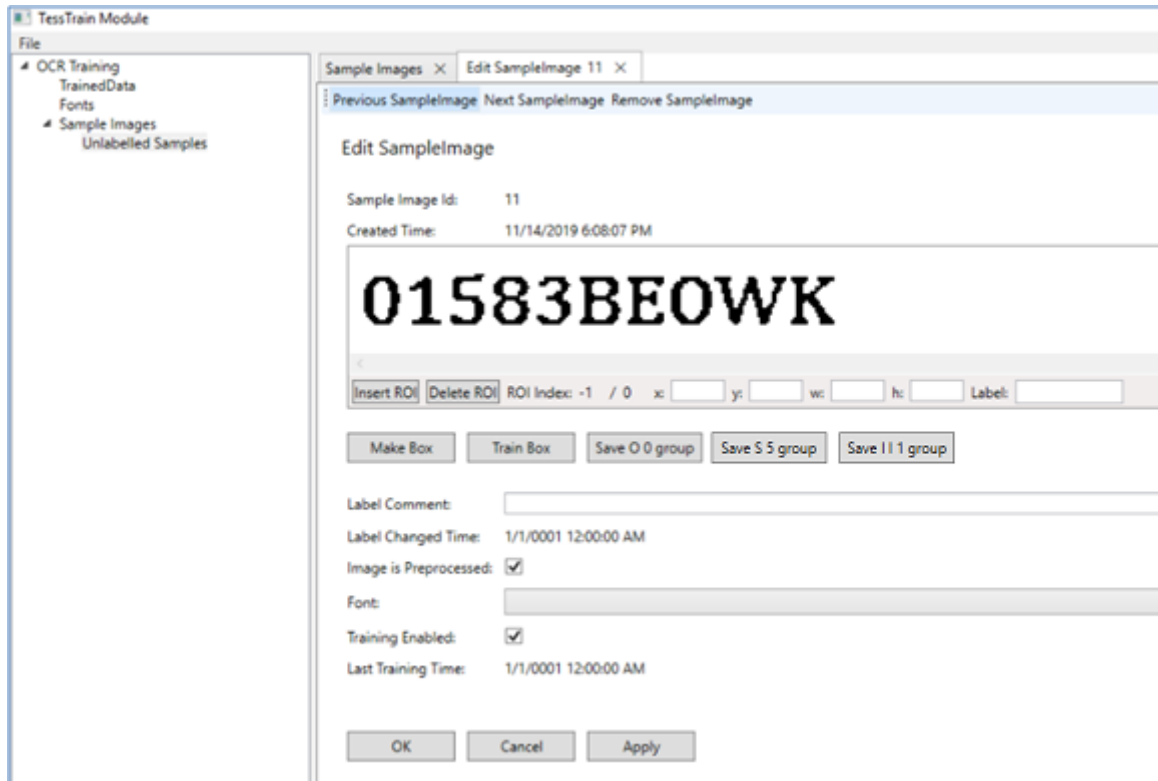
6.10. OCR Enhancement for Special Case

For some cases, the character O and 0 [S and 5], [I, l and 1] is not easily to recognize by the Tesseract OCR. We provide another method to solve it as follow.

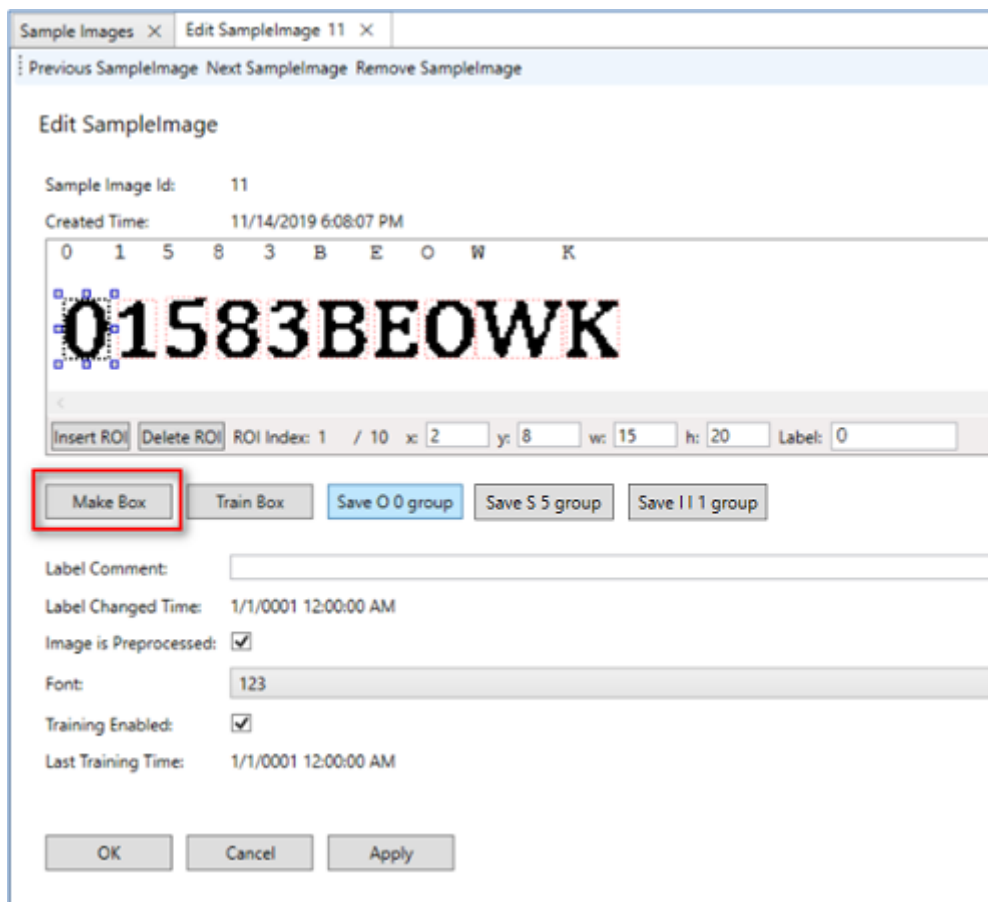
- 1) Open the Tesseract OCR training tool: Tools→Config→Tesseract OCR Setting→Training Tool



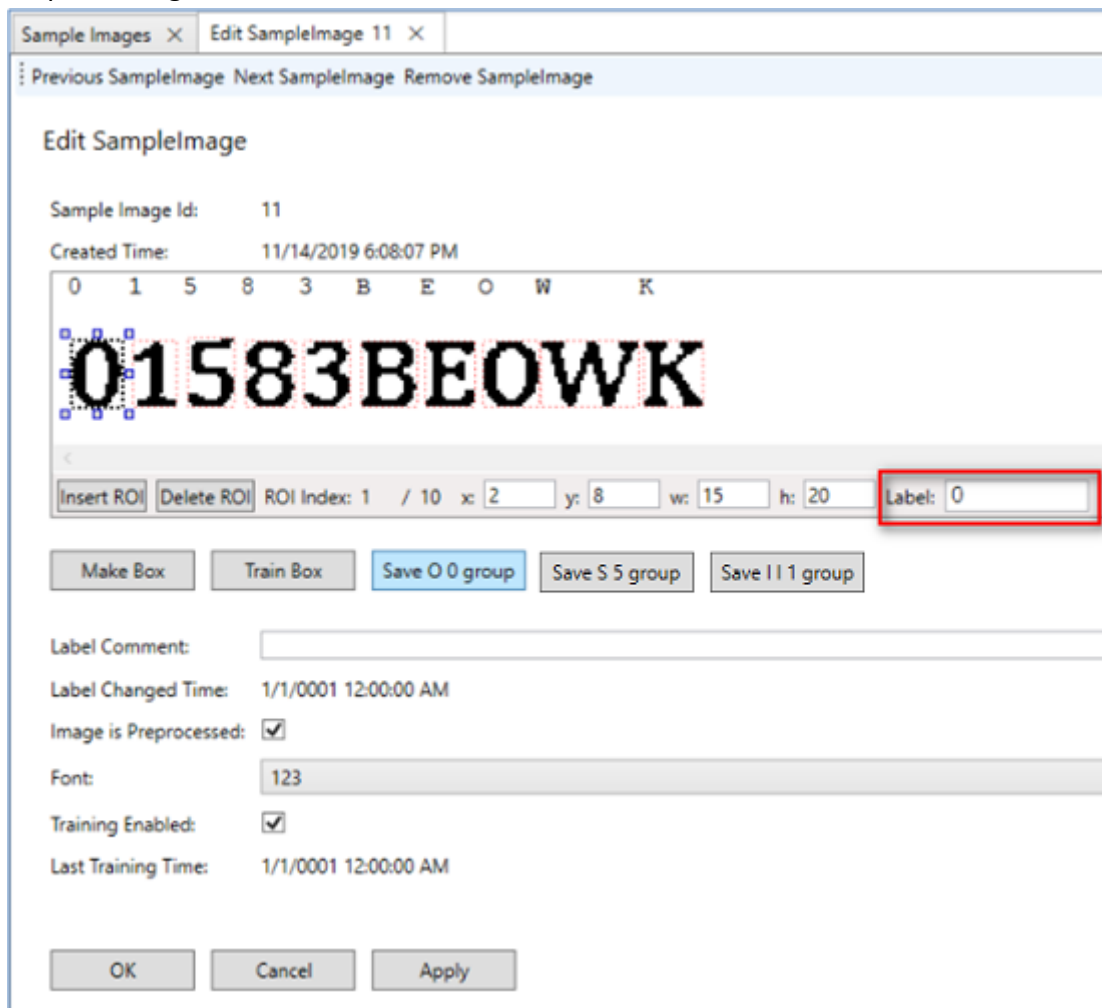
- 2) Choose your ROI



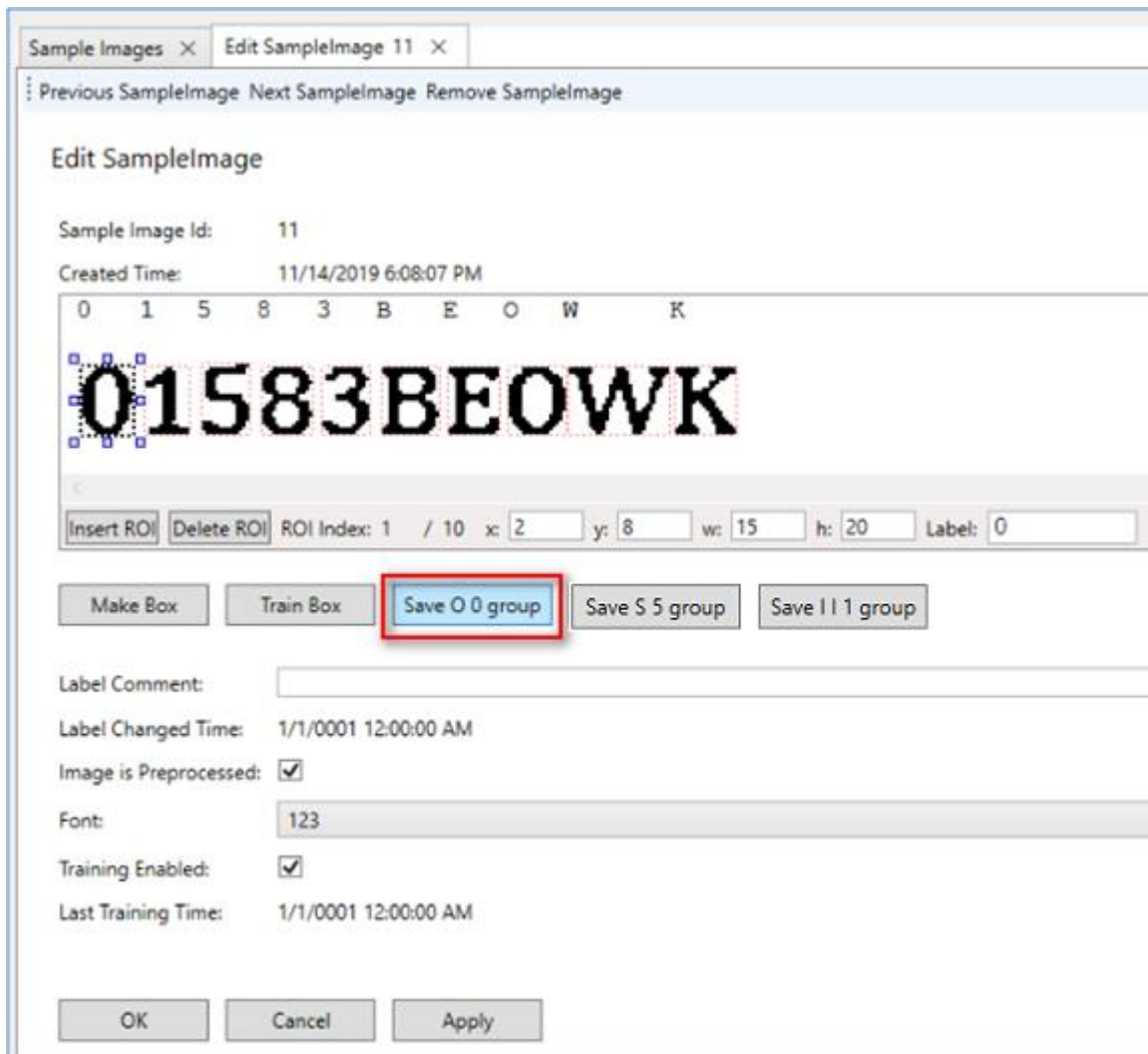
- 3) Click "Make Box"
- 4) Click the "O" or "0" on the word



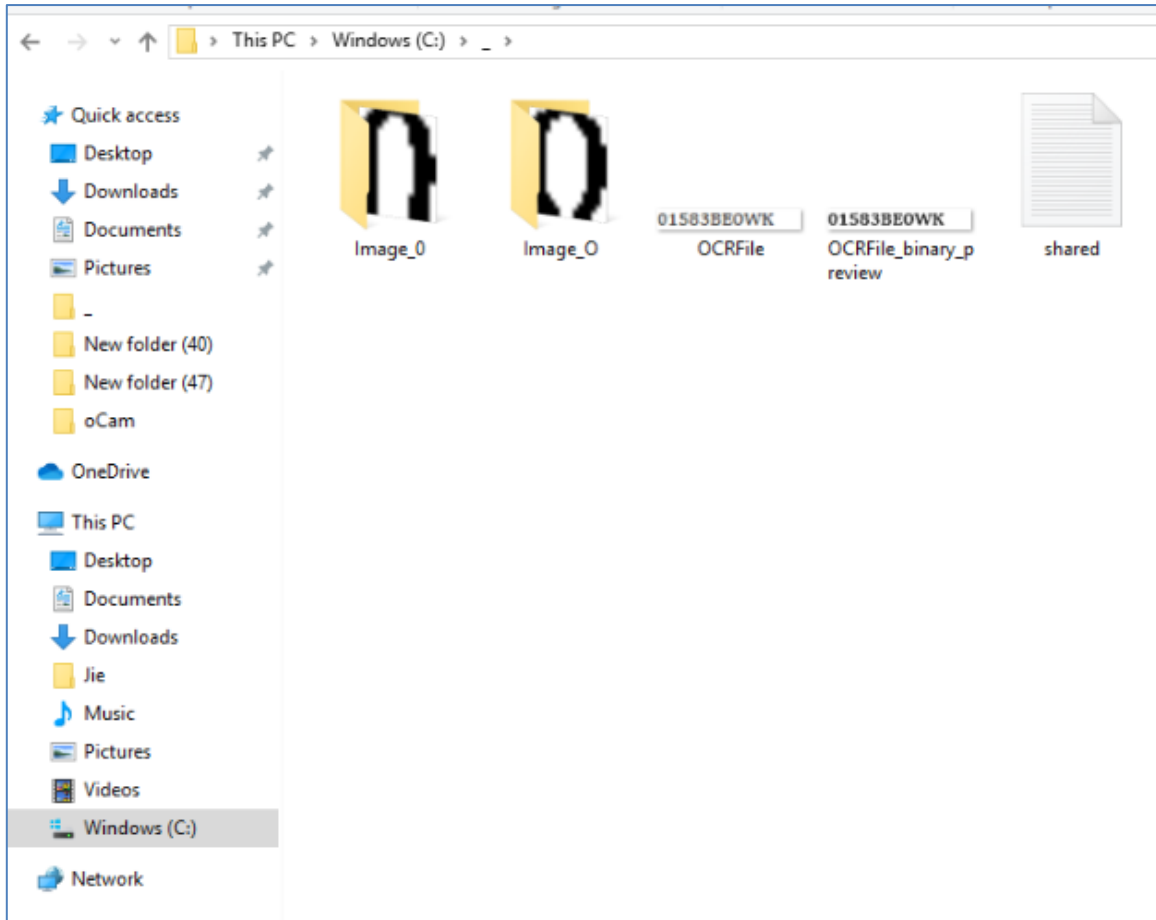
- 5) Input the right character on the Label



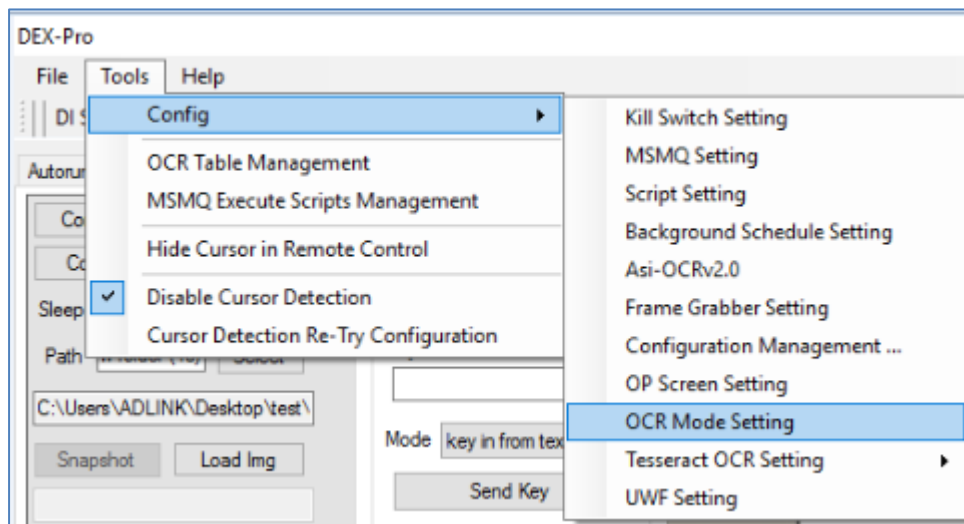
- 6) Click "Save O 0 group"



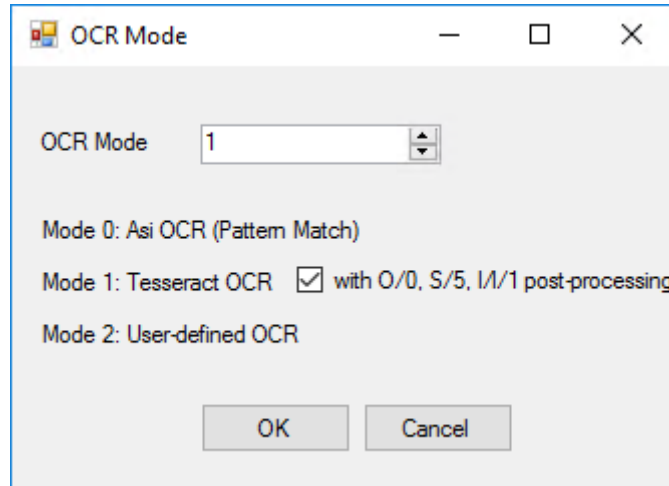
- 7) If more than one "O" or "0" in your word, you can go to step 4) and repeat 4)~6)
- 8) If you train these characters in other PC, remember to copy your training images to the DEX100 C:_



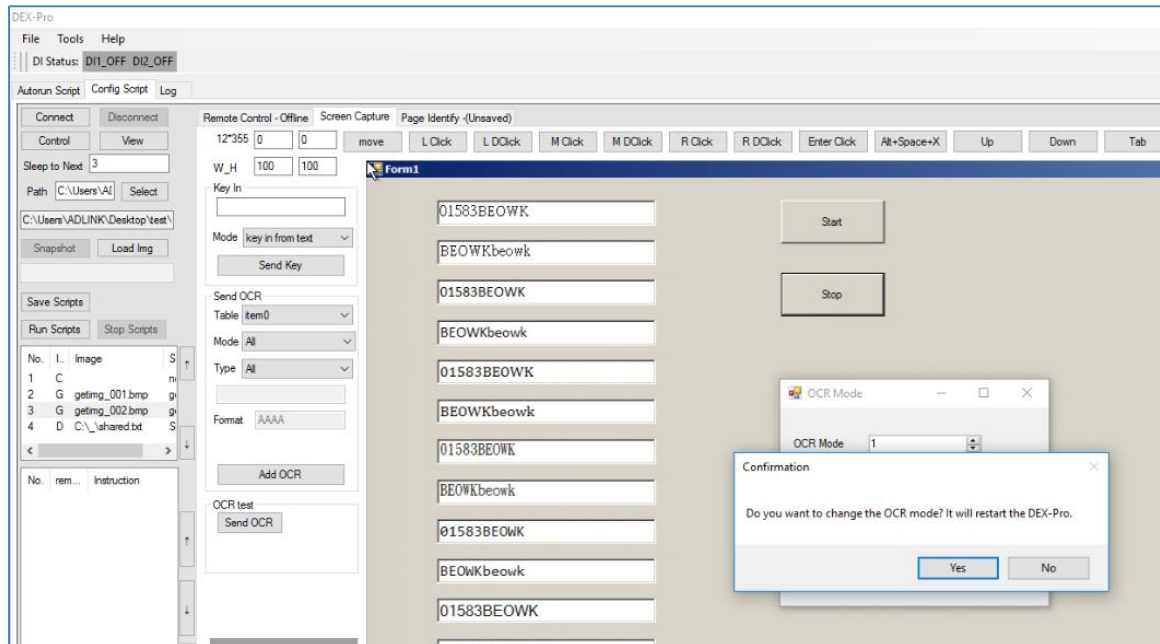
9) After training these images, click the Tools → OCR Mode Setting



10) Check “with O/0, S/5, I/I/1 post-processing”



11) Click “Yes” to restart the DEXPro and the function is enable



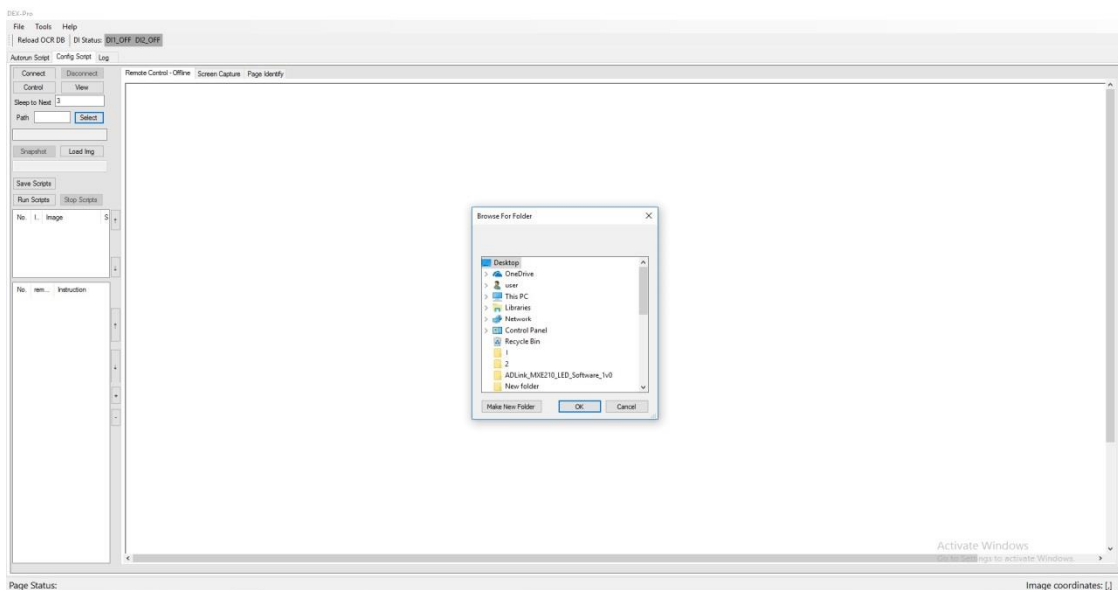
7. DEX-PRO function reference examples

7.1. Create a simple OCR script (Asi-OCR)

1) Setup Path.

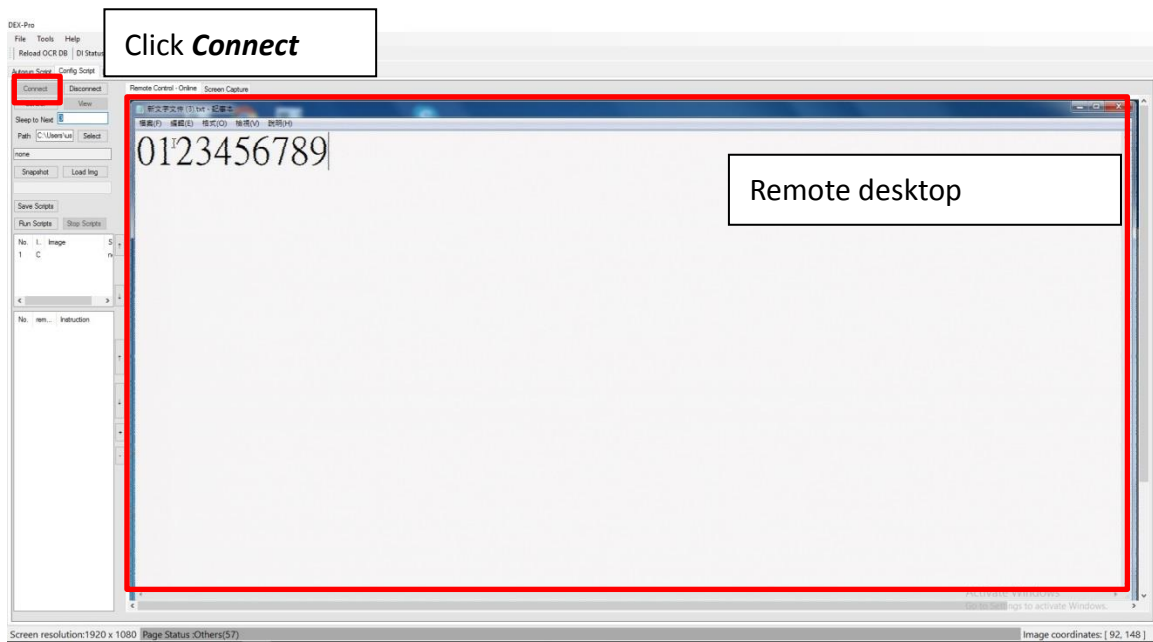
Before you use script editor, you **must** set **Path** first. It will restore script info(*.spt), image layer(*.bmp) and BMP List file (*.blf) at the folder, see 7.10 for more details for common files and directory.

Select **Config Script** panel and click **Select** button



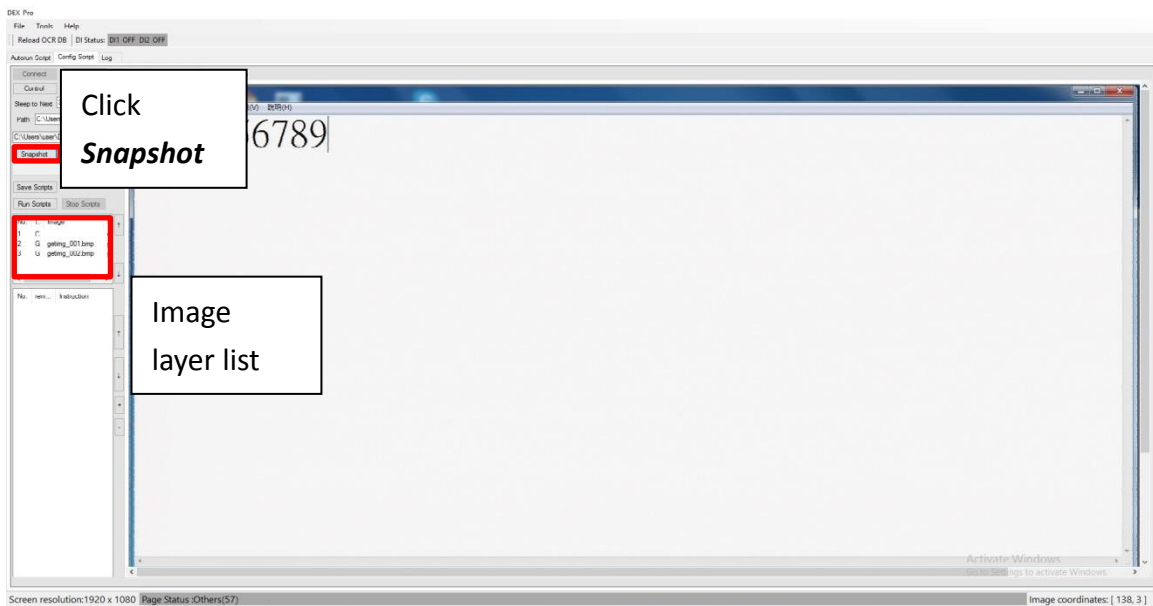
2) Connect to and operate with remote host

Click **Connect** button and you will see host's desktop in real-time on the right part. Click **Control** button then you can control host machine with mouse in left panel as remote desktop. Operate the host to the scene that you want to extract data with.



3) Take screen-shot for host screen.

When the desired scene of host is ready, click **Snapshot** button. A screen-shot image will be add as new image layer, getting_001.bmp, into imgae list.



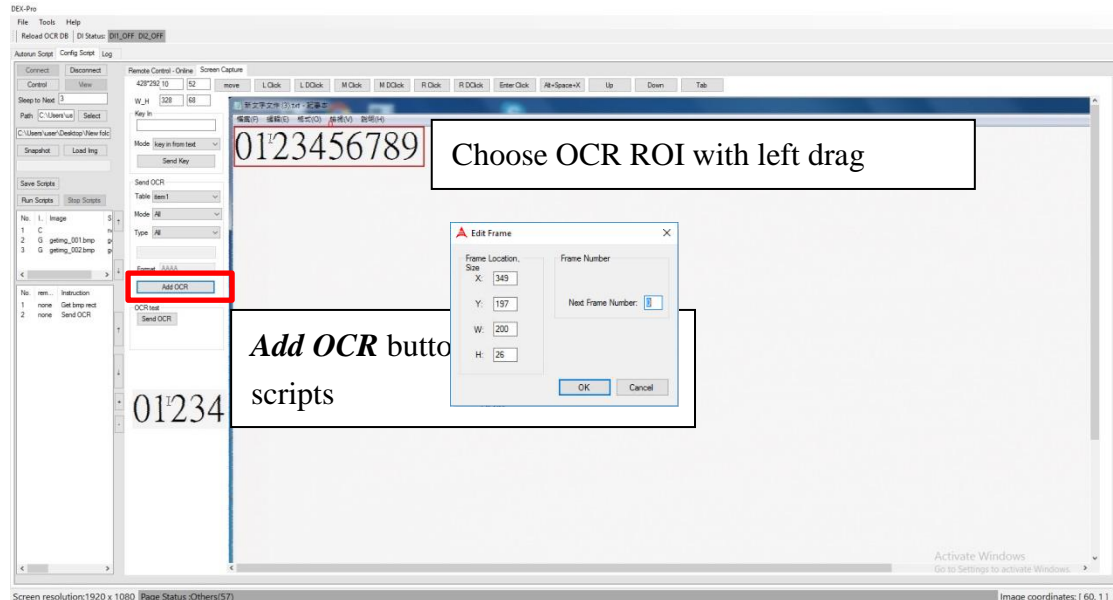
4) Click button **Disconnect** if all desired images are collected, otherwise repeat step 2 and 3 to captured images. In this case, we capture 2 images for each tab respectively.

5) Select ROIs for OCR.

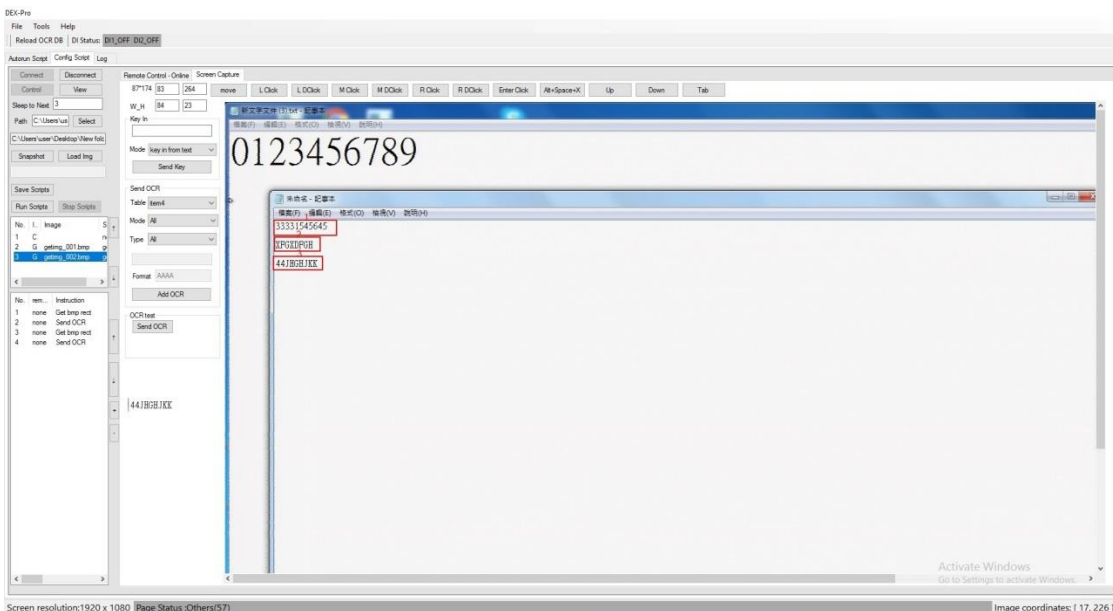
Click item in layer list, eg., getting_001.bmp to show the screenshot image. Choose a ROI with left drag and add Send OCR button. Now two instructions, "Get bmp rect" and "Send OCR" will be added to script. If you are using Tesseract OCR mode, follow the relative

steps described in section 6.10 after pressing the Send OCR button.

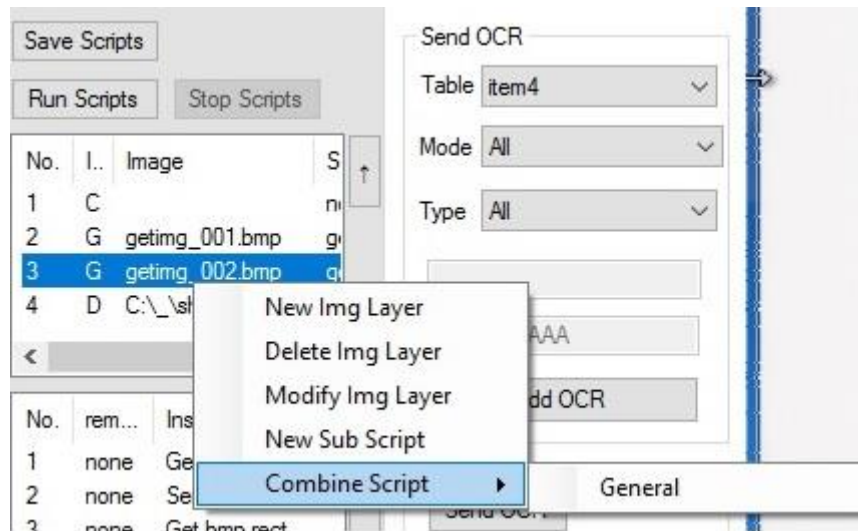
If you want to modify the ROI's position and size, simply press down the right mouse inside the target ROI. The Edit Frame form will pop up for you to modify its position (X, Y) and size (Width, Height).



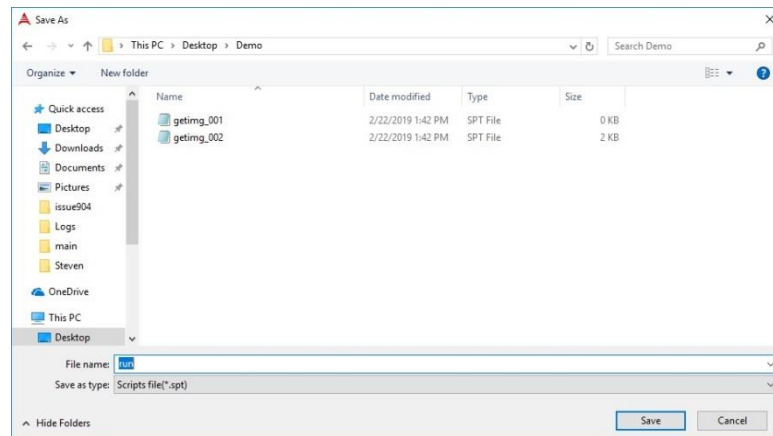
6) Repeat Step 5 if more ROIs for OCR are needed. In this case we select 1 ROIs for layer image1 and 3 ROIs for layer image2. Notice that after editing each layer, press Save Scripts or File->Save File to save the temp.blf in related folder you provide.



7) Right click on layer list and select Combine Script->General. The instructions in each layer will be integrated to single script file.

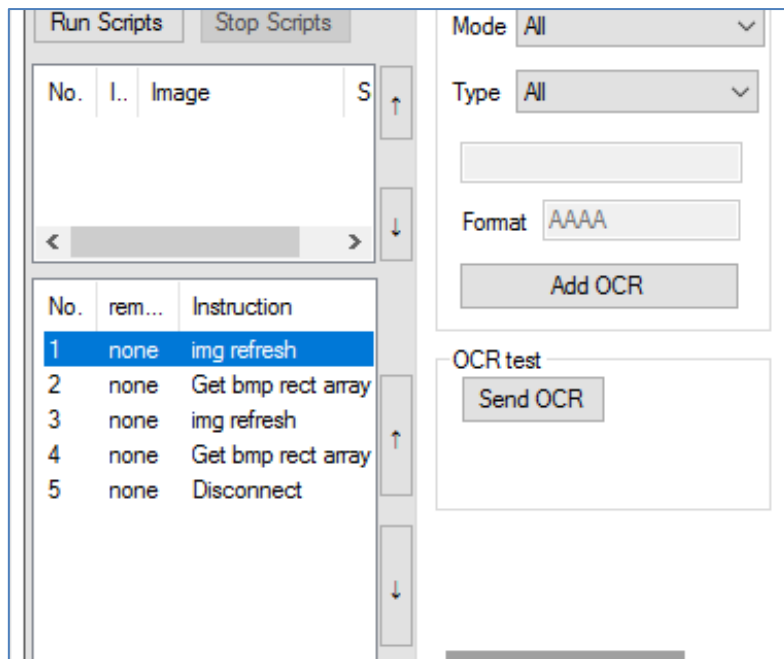


- 8) Save script with saving dialog. After step 1-7, the folder will contains 2 spt files for 2 layers respectively. Input a different name for the script file., eg run.spt



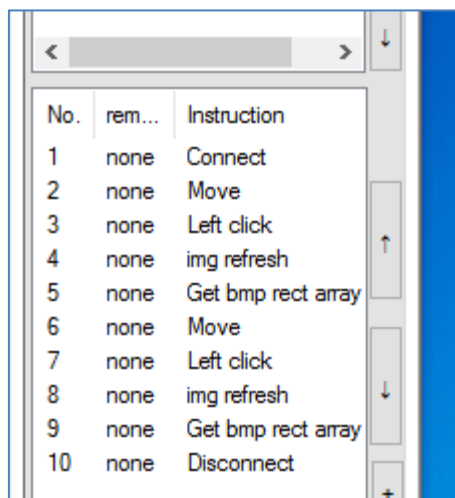
- 9) Load previous save script.

The generated script contains default instructions: mainly twice OCR instructions, “Get bmp rect array” for two layer 1 and 2. An instruction “img refresh” is suggested to refresh host screen to capture stable image before OCR.



10) Editing script.

In the last step, we need to modify the default script to fulfill data extraction for tab page 1, and page 2. The script supposes to connect host in the beginning, and click on tab1 then perform OCR, following another click on tab2 and OCR analysis. See Chapter 5 for detailed instruction description and examples.



11) Run Script

Click button Run Scripts then you can see DEX-100 operates as script instruction. When the script is finished, click Tools->OCR Table Management to see the OCR result. The accuracy of OCR result is not good, we need to train OCR engine to improve the accuracy. Note. If the OCR engine cannot detect text in ROI image, OCR result will be "Asi-OCR" and screen shot image will be saved in "C:\OCR_Failed".

No.	Name	Value	ConfidenceLevel
0	item0	0123456789	83
1	item1	33331545645	79
2	item2	XFGXDFGH	80
3	item3	44JHGHJJK!	76
4	item4		
5	item5		
6	item6		
7	item7		
8	item8		
9	item9		
10	item10		
11	item11		
12	item12		
13	item13		

7.2. OCR Training example

- **Tesseract OCR Training**

When the OCR Mode used in Tesseract, you can find a training tool in Menu bar here:

Tools->Config->Tesseract OCR Setting->Training Tool

After press the "Training Tool", the training Form will pop up like below,



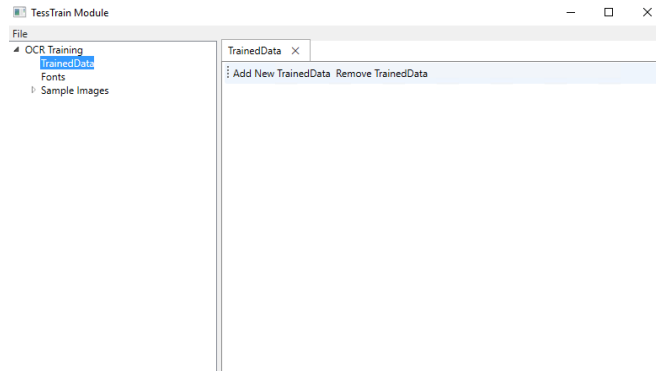
There are three parts in this training tool: (1) TrainedData; (2) Fonts; (3) Sample Images.

Each of the three component will included in the example below:

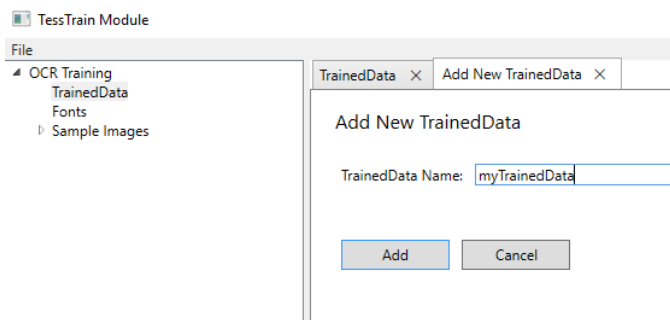
Step 1: Create a TrainedData

Double Click the TrainedData label at the left list view, then the functions will appear in the right panel.

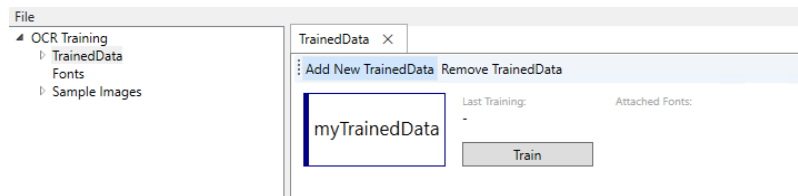
There are two label for you to add or delete the created trainedData. Now, press "Add New TrainedData".



After pressing the “Add New TrainedData”, the required information are shown below. Here, input your trainedData name in the text input area. For this example, we named the trainedData “myTrainedData”. Simply press “Add” button to add this trainedData to the record file.

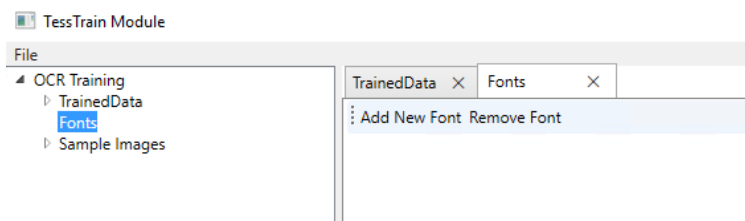


Simply press “Add” button to add this trainedData to the record file. The created trainedData will shown below this panel.



Step 2: Create a Font

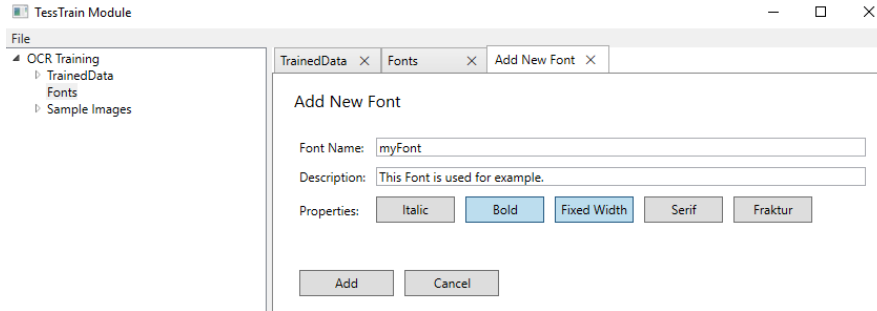
After you created the trainedData, we continuously create the “Font”. This “Font” means where the training images(Training images now are not added yet and will describe in the Step 3.) belongs to. Double click on the “Fonts” in the left panel and there will show a new tab item called “Fonts” in the right panel. Also, there will have two function labels for you to add and remove the Fonts.



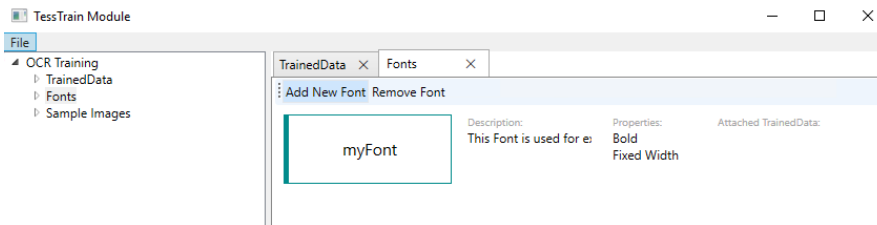
Now, press “Add New Font”, another tab item shown just next to the Fonts tab. You need to input the required information for this Font you created:

- (a) Font Name: Denotes the Font you created. In this example, we name it “myFont”.
- (b) Description: Type some descriptions for this Font you created.
- (c) Properties: This properties should set based on the image. If your images is bold, select the Bold button. In this example, we assume that in our images include Bold and Fixed Width.

After all the properties are provided, simply press the “Add” button.

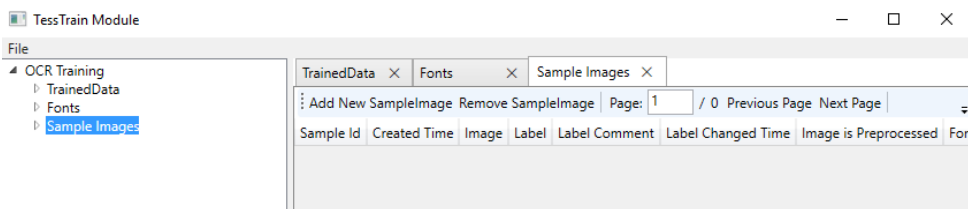


After you add the font, the information will shown below just like TrainedData did.

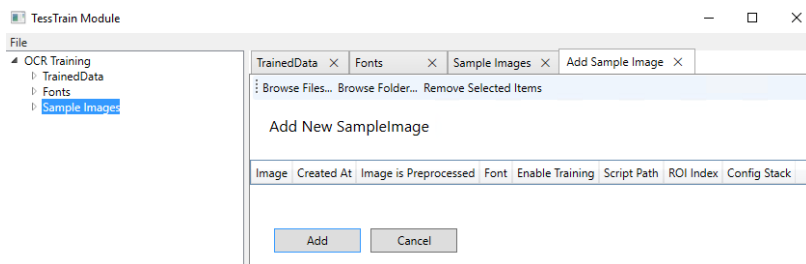


Step 3: Import images into this Training Tool

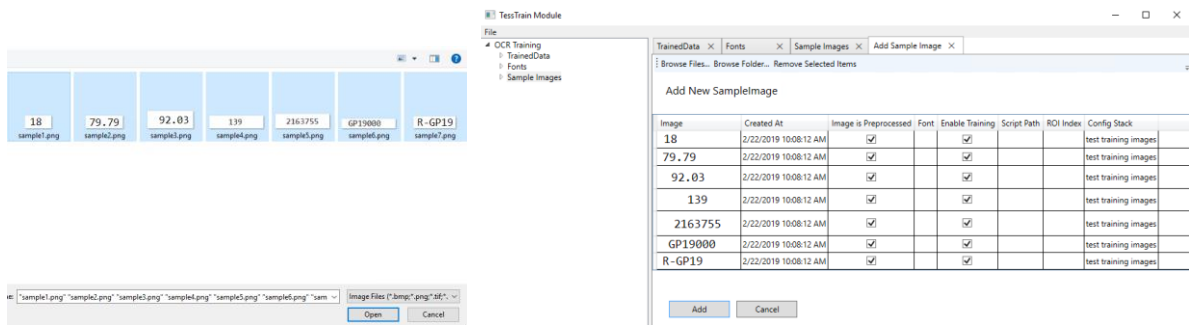
In this step, we are going to adding the images which are used for training. Double click on the function label “Sample Images” in the left panel and there will appear the “Sample Images” tab. Of course there have add and remove function label for you to add and remove the images. Also, there have simple viewer function for you the see the images we had added.



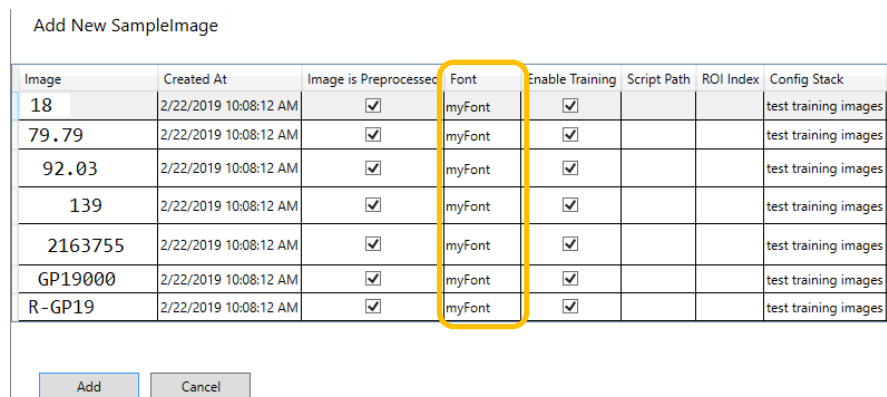
Just like trainedData and Fonts did, press “Add New SampleImage” function label. The “Add Sample Image” tab occurred.



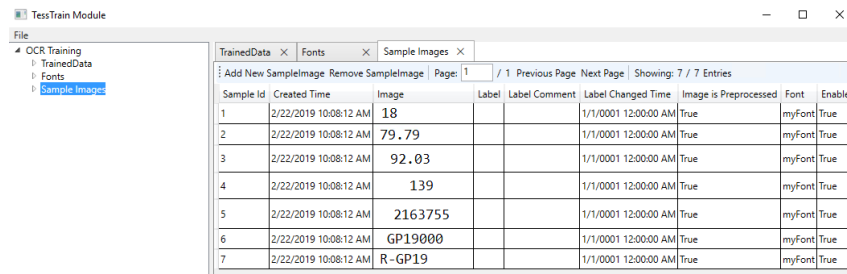
Here you can use Browse Files or Folders to import the images you want to use for training. In this eample, we use “Browse Files” to import the images we are going to use.



Multi-Select the images and open them. The imported images will listed in the panel. Here now you need to indicate each images belongs to which Font. In this example, we indicate each image to the font, myFont, we created just now. After you incated, it looks like below:

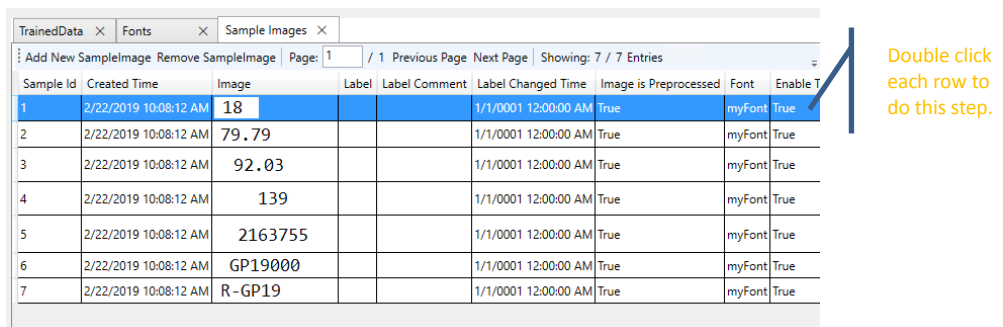


Then Press "Add" button below this panel to finish the import. And you will see the imported image in the "Sample Images" tab.



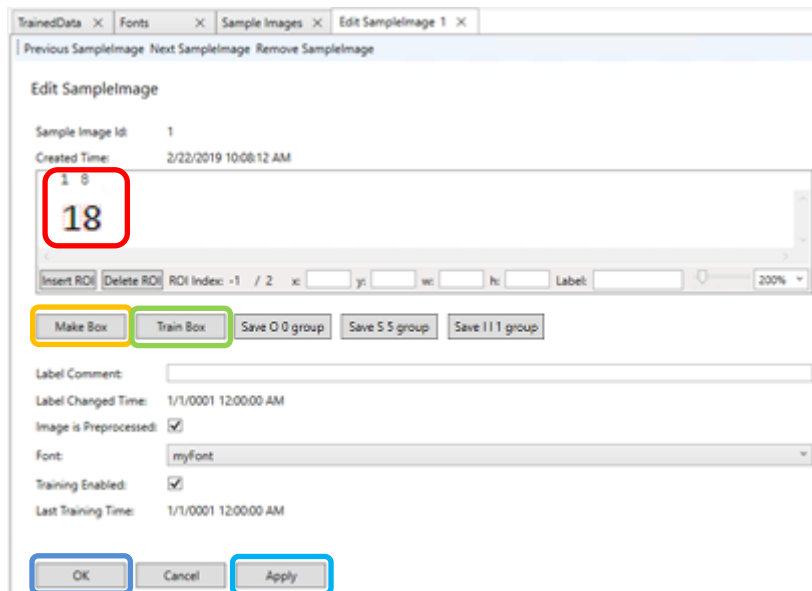
Step 4: Boxing and each imported images and indicate to Font

In "Sample Images" tab, double click each sample image to do this step.



Here, we use Sample Id 1 for example. After you double click on the row, the "Edit SampleImage 1" tab occurred. Press "Make Box"(orange region) button to create the boxes of each character. The box result will

show(red region). You could edit the boxes position and size by clicking one of them, and manipulate the sizing pins or by using the textboxes to manually change the x, y, width and height values. The box label can be changed by pressing a keyboard key while the box is selected, or by changing the value in Label text box. More boxes can be added by using the "Insert ROI" button where it will add the new box on the right side of currently selected one. Boxes can be deleted as well by using the "Delete ROI" button.



After Boxes are proper modified, "Apply" button should be then pressed(sky blue rectangles). Otherwise there will not be stored.

Continuesly press "Train Box" button(green rectangle) for generating the required features for further training. Also check the Font is belongs to which one you want to assign. Notice that you should also press "OK" or "Apply", otherwise changes will not be committed until "OK" or "Apply" button(blue rectangles) at the end of the page is clicked.

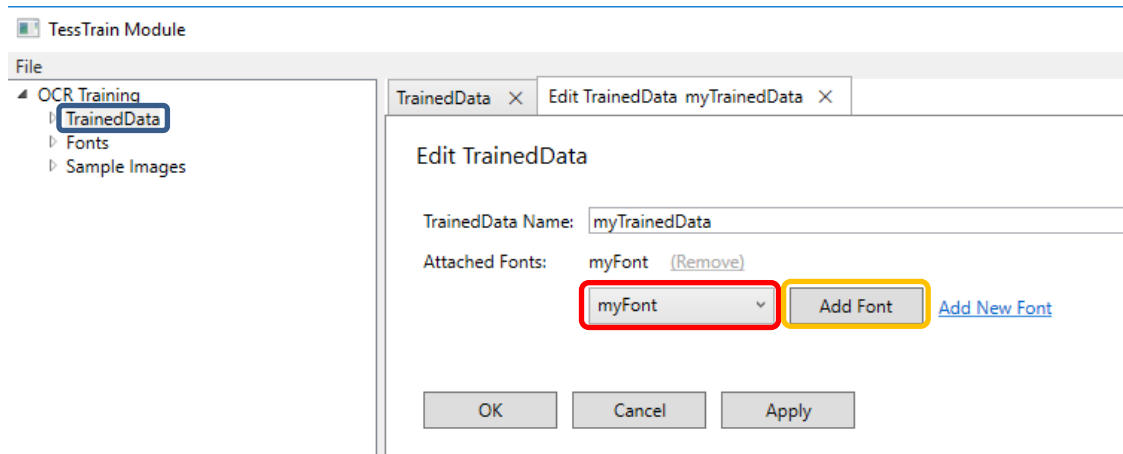
Do this for each image you imported. This is the pre-procedure that you are getting start the training. (As shown below)

Sample Id	Created Time	Image	Label	Label Comment	Label Changed Time	Image is Preprocessed	Font	Enable Training	La
1	2/22/2019 10:08:12 AM	18	18		3/11/2019 9:54:51 AM	True	myFont	True	3/
2	2/22/2019 10:08:12 AM	79.79	79.79		3/11/2019 9:56:58 AM	True	myFont	True	3/
3	2/22/2019 10:08:12 AM	92.03	92.03		3/11/2019 9:59:22 AM	True	myFont	True	3/
4	2/22/2019 10:08:12 AM	139	139		3/11/2019 9:59:33 AM	True	myFont	True	3/
5	2/22/2019 10:08:12 AM	2163755	2163755		3/11/2019 9:59:45 AM	True	myFont	True	3/
6	2/22/2019 10:08:12 AM	GP19000	GP19000		3/11/2019 9:59:53 AM	True	myFont	True	3/
7	2/22/2019 10:08:12 AM	R-GP19	R-GP19		3/11/2019 10:00:17 AM	True	myFont	True	3/

Step 5: Assign the Font to TrainedData

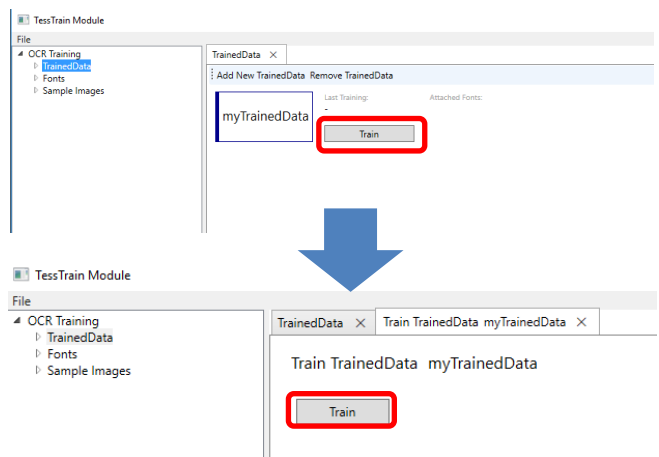
After you created the font, assign it to the TrainedData. In this example, we assign "myFont" to

“myTrainedData”. Double click the label TrainedData in the left panel(blue rectangle), then double click on the row in the right panel. The information of the “Edit TrainedData myTrainedData” shows. Select the font we created(myFont), then press “Add Font” to add it into this trainedData(myTrainedData).

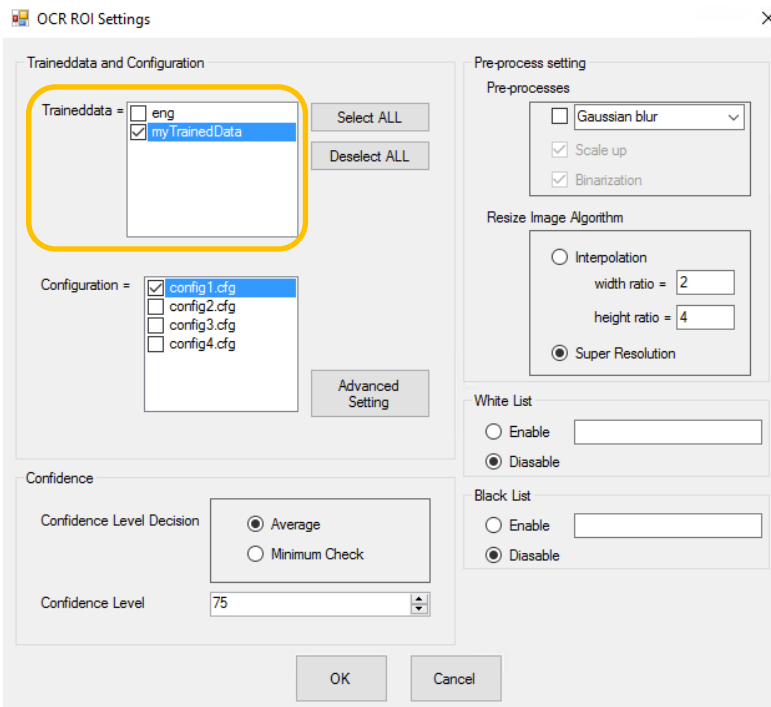
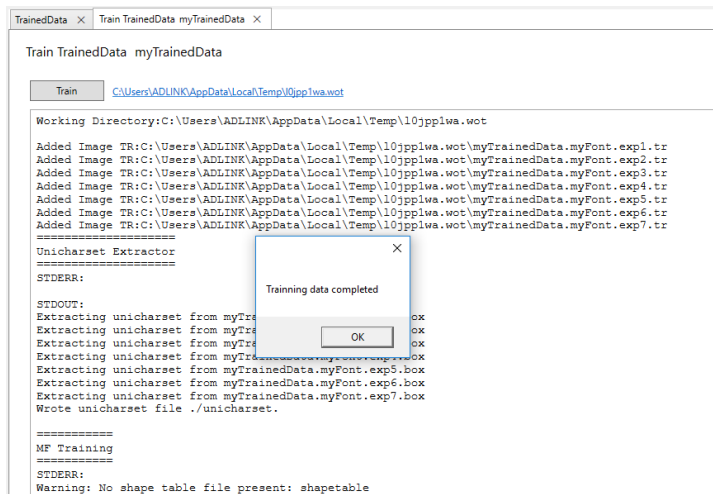
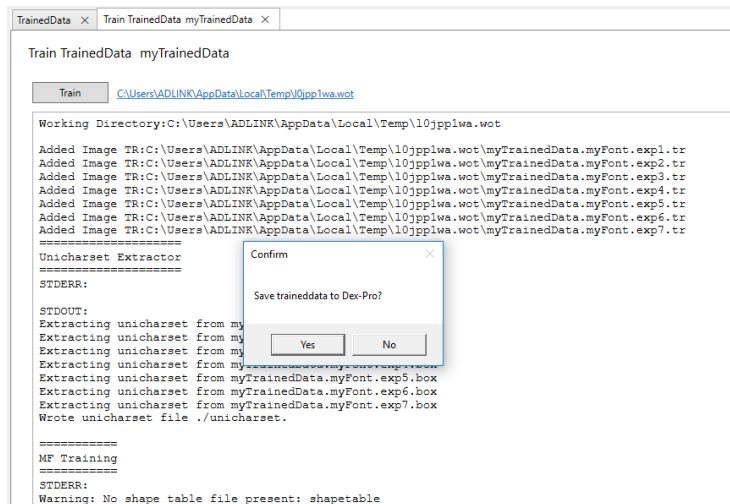


Step 6: Train the TrainedData we created

Go back to the TrainedData, there the TrainedData can be press the “Train” button. After you press the “Train”, page will redirect to the new tab “Train TrainedData myTrainedData”. Still simply press the “Train”.



When training process finished, a message box will show to let you confirm to store the traineddata to the Dex-Pro for using. Just press Yes and complete message shown. Here, we can go back to use the traineddata we trained(see the orange rectangle, it will appear in the settings and you can use the trained result.).

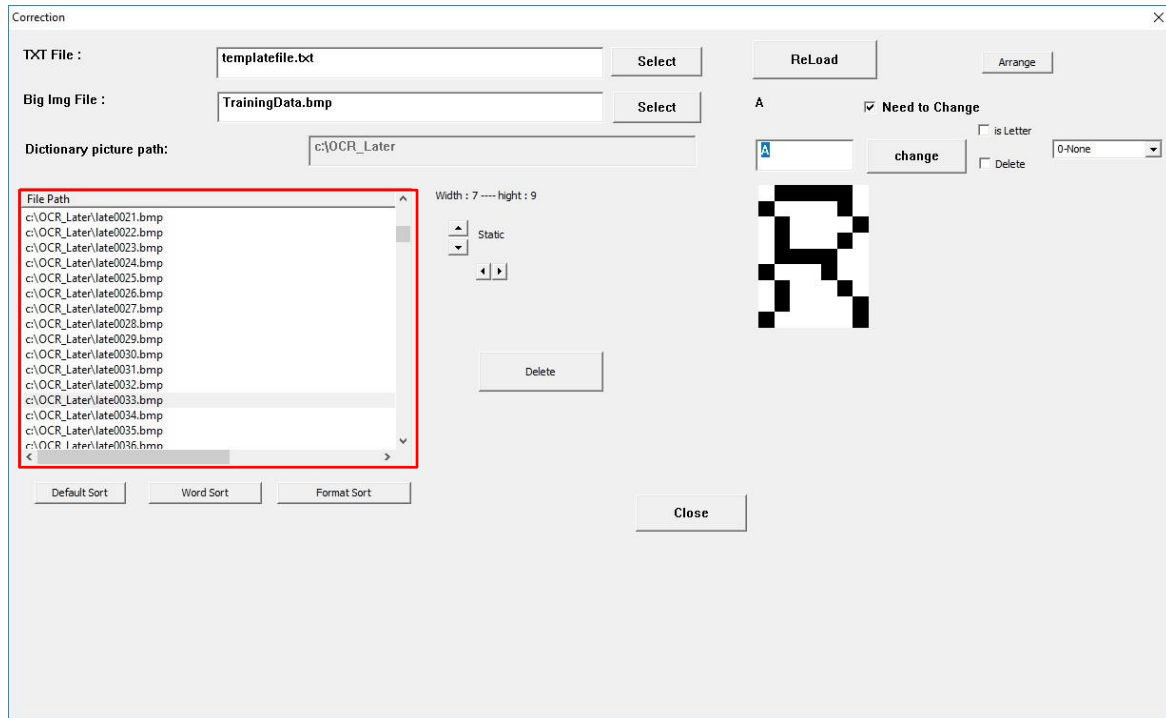


● Asi OCR Training

In this example, we train OCR with OCR_Tool (“C:\Program Files\ADLINK\DEX-100\main\OCR_Tool.exe”) to improve OCR accuracy in example 7.1.

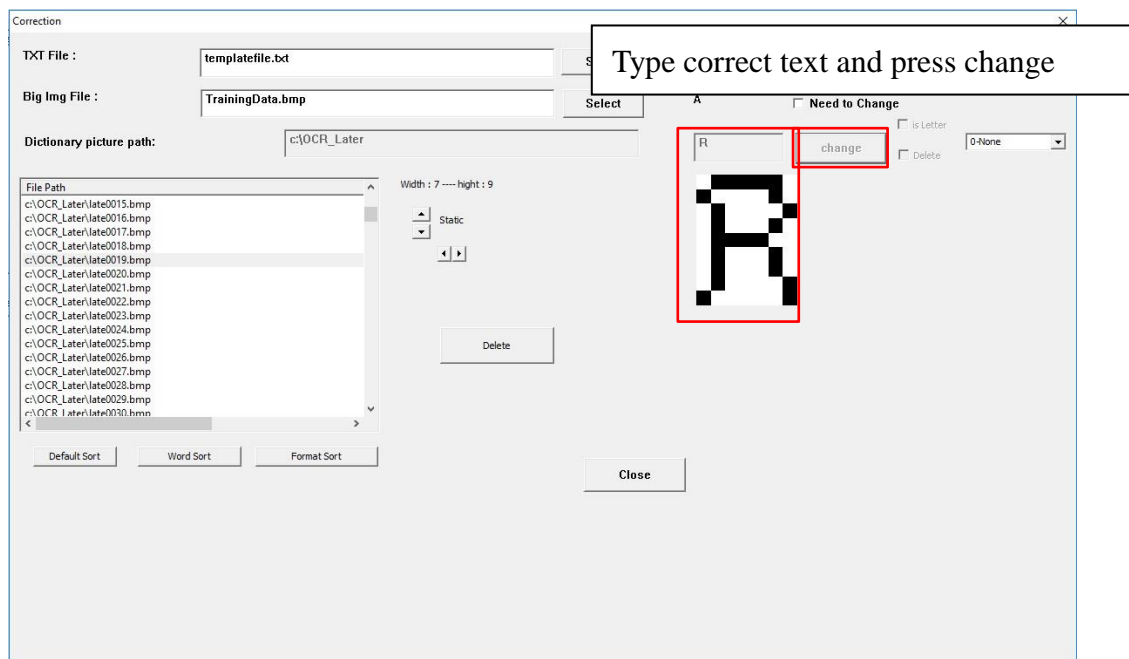
1) Run OCR_Tool.exe and open the **Correction dialog** by click menu item Tools->Correction.

DEX-Pro added all letters in to OCR DB aftering execution script in example 7.1.

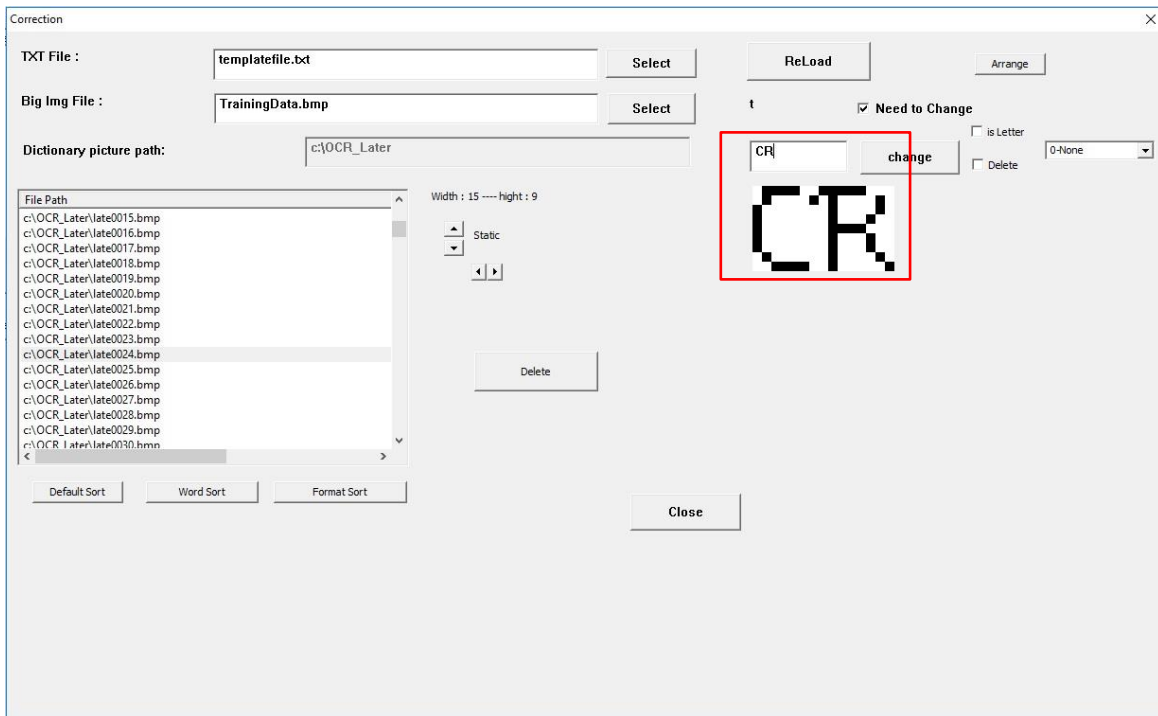


2) Correct OCR DB

The first letter is 2, but recognized as S. We need to correct it. Type correct text in the TextBox and pressed the button *change*.

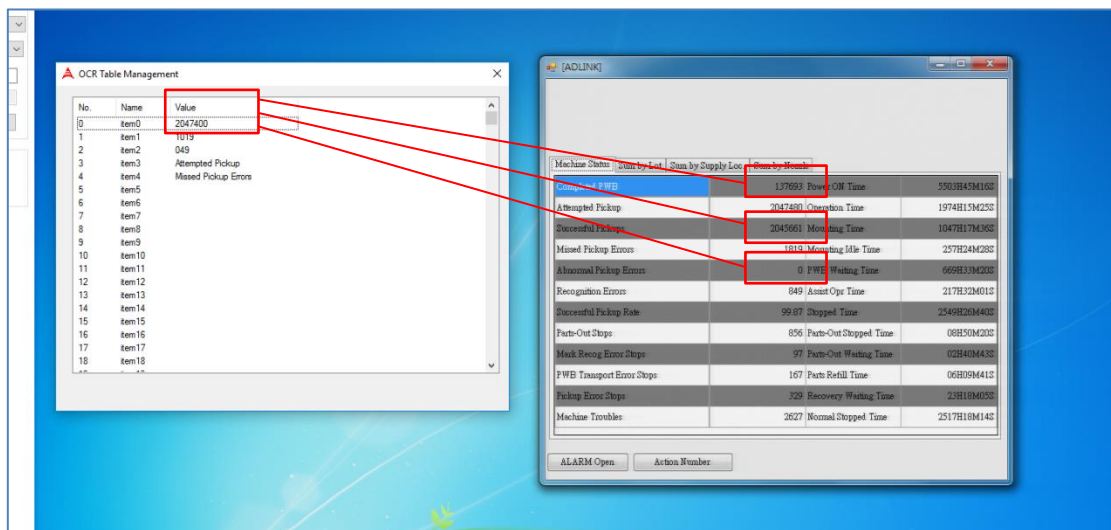


3) The correction is not limit to single character. If the letter contains more than one character, it is able to input multple characters.



4) Make correction for all the letters in DB. Then run the script in example 7.1 again.

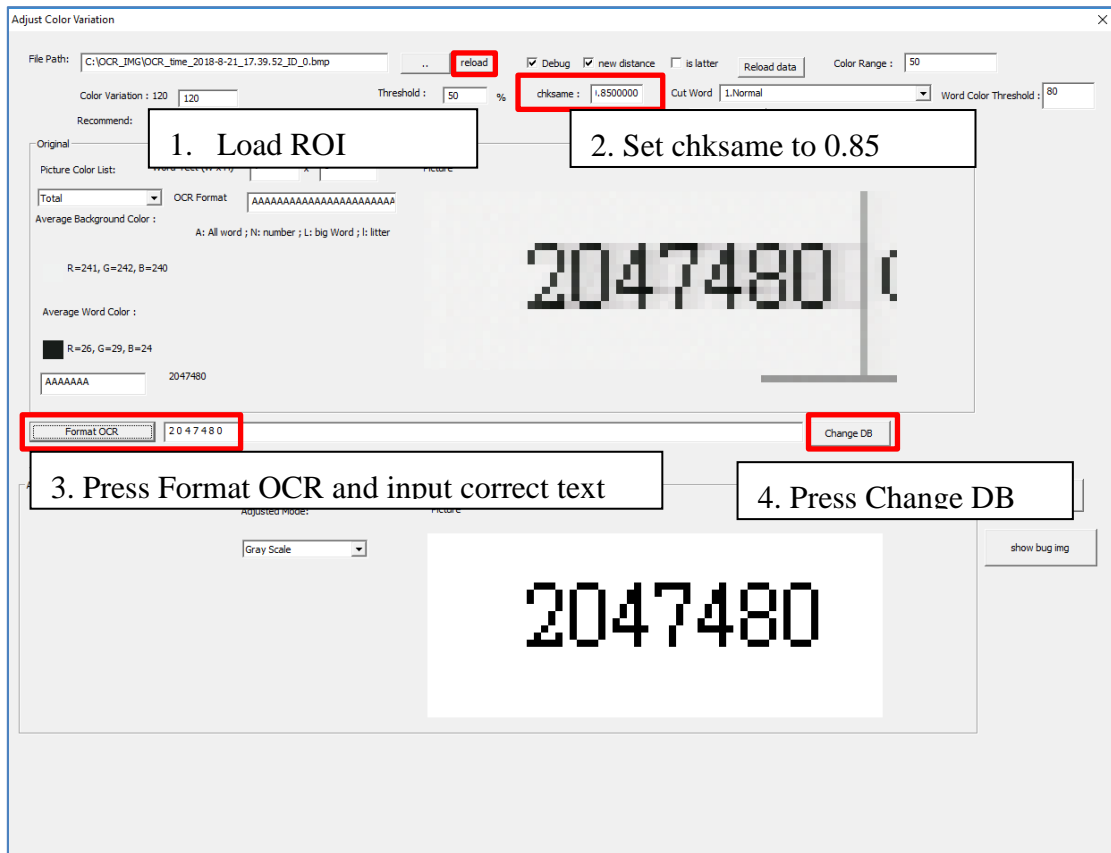
The reuslt was imporeved significantly. We can correctly recognize alphat and digital numbers. With closer look, the digit '8' still incorrect. It should be 2047480 in stead of 2047400 for the first ROI. Similar, it should be 1819, 849 for second and third ROI respectively.



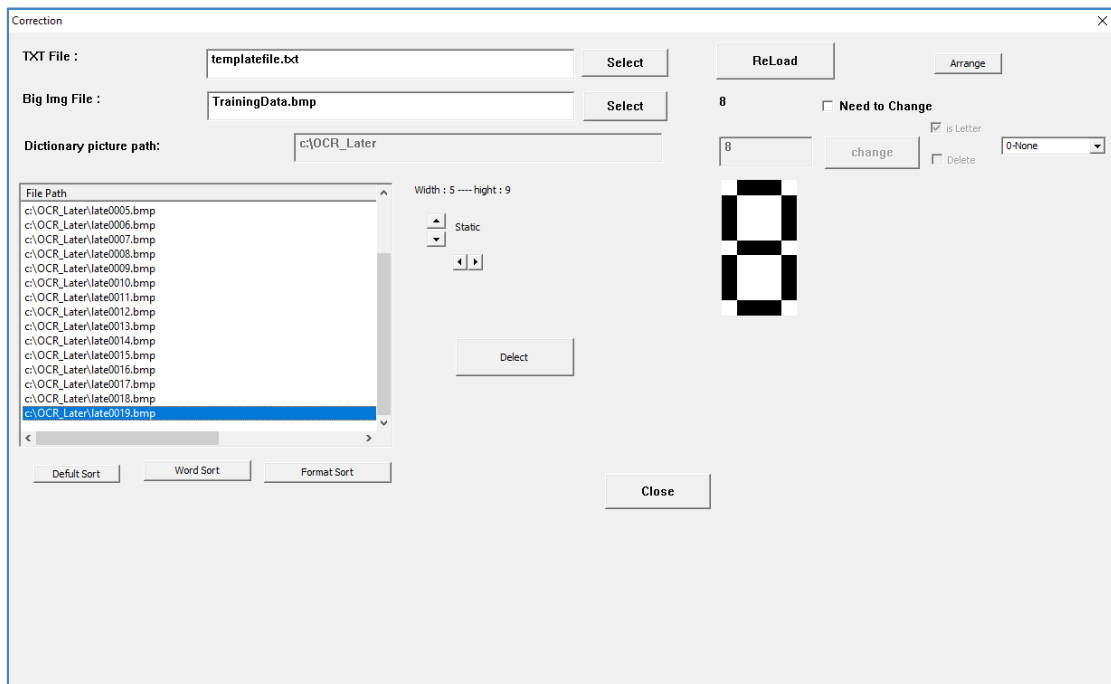
5) Adjust similairty.

In this case, the similarity threshold is too low to tell digit 0 and 8. We find no letter 8 in OCR DB with Correction dialog. We can use "Adjust Color Variation" in OCR_Tools to find proper similarity. We can find and load ROI image in C:\OCR_IMG and adjust similairy to 0.85. The first recognition reslut is 2 0 4 7 4 0 0. We modify it to 2 0 4 7 4 8 0

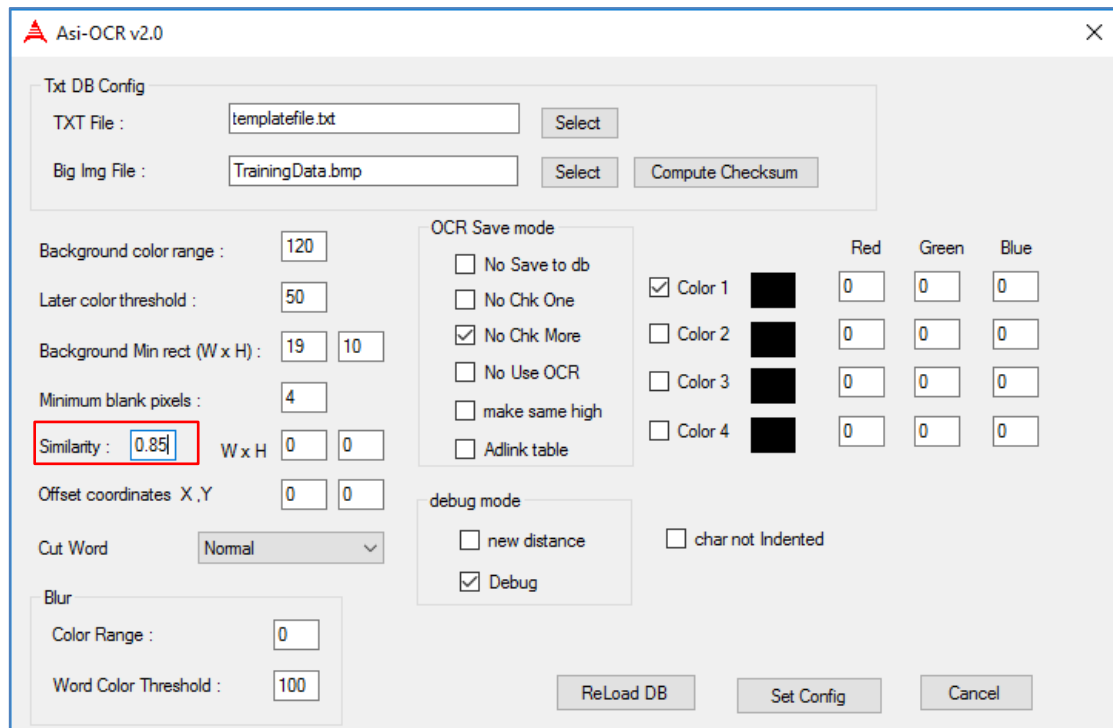
and press the button *Change DB* save the result. See section 4.1.2 for more details of “Adjust Color Variation”.



6) Check DB, the letter 8 is now added to DB.



7) Apply the similarity in DEX-Pro to 0.85, and run the script again.



8) Check the results again, now we can recongize all digials correctly.

OCR Table Management

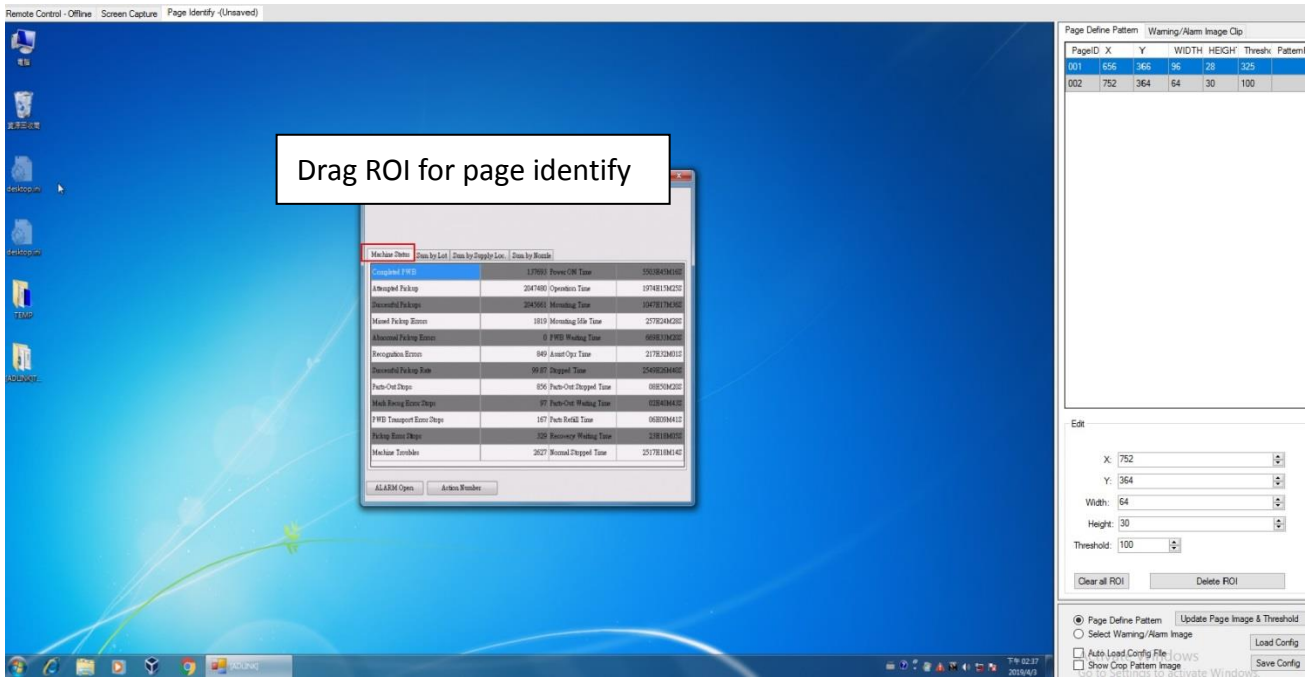
No.	Name	Value	ConfidenceLevel
0	item0	OCR	82
1	item1		
2	item2		
3	item3		
4	item4		
5	item5		
6	item6		
7	item7		
8	item8		
9	item9		
10	item10		
11	item11		
12	item12		
13	item13		
14	item14		

7.3. Page identify example

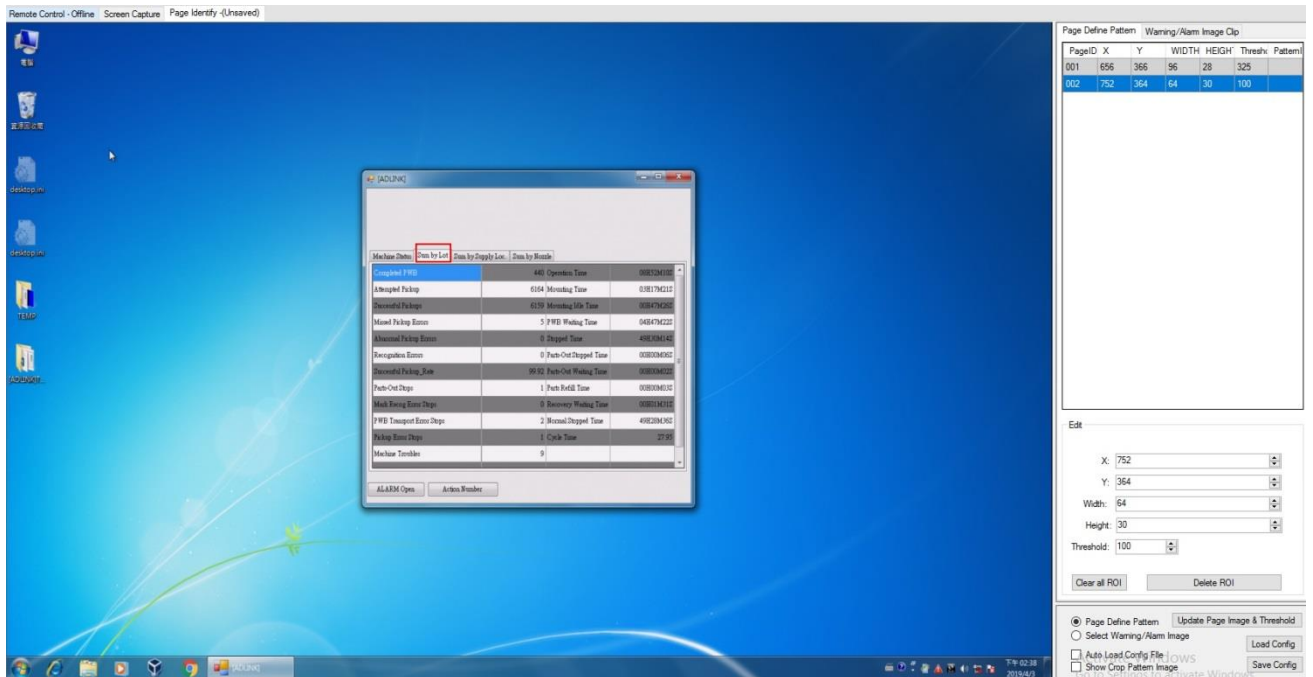
In previous example, we assume the page is stable and page changes only when mouse clicks on the tab control. For more complex environment, for example the page tab will randomly change itself without any click. In this case, we need to identify what the current page is before OCR to extract correct data.

- 1) Set the same path as sample 7.1 and load tmp.blf file which contains layer information.
- 2) Select unique pattern to identify the page.

In page identify editor, select first layer by clicking "getimg_001.bmp". Drag mouse to select the pattern. In this case, we select the tab label as the pattern.

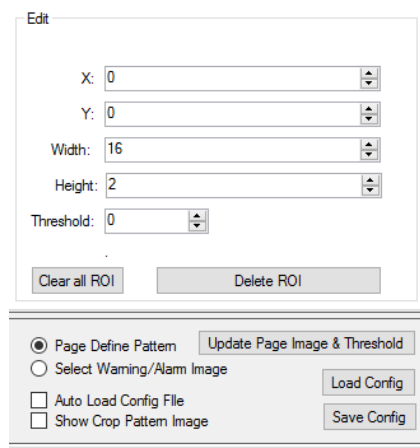


- 3) Repeat step2 for all pages.



- 4) Save page identify config by clicking "Save Config". The config can be load by manually

click “**Load Config**” or automatically when Dex-Pro is started if the option “**Auto Load Config File**” is checked. Note, the config file is saved and loaded with the PATH directory, therefore set PATH directory first with correctly access the config file.



5) Check page identify result.

Connect remote host and check the result with online screen. The identify result is show on the status bar. For example, the status is “Normal(1) 0” which means Page 1 is identified with the recognition of Pattern 0. A page can has multiple patterns and all patterns have to be recognized to identify the page. If the page is not recognized correctly adjust the threshold for pattern.

Note
The default type of page status is “Normal”. If you want to set another type of page. Please see the detail in section 7.5 Warning /Alarm setting flow. We provide some parameters for page definition are described as following figure.

Figure (The page type parameter)

Page Type	Page Configurations (Parameter)	Description/Remark
Normal (default)	<ul style="list-style-type: none"> ● Description 	Normal page only using the description of page.
Warning	<ul style="list-style-type: none"> ● Message Number ● Description 	User can define the warning number/code of their warning page.
Alarm	<ul style="list-style-type: none"> ● Major Code ● Minor Code ● Description 	User can define the alarm Major/Minor code of their alarm page.

Page Type: define which type the page is

- Normal: normal page (The page number will display in navy blue in status bar)

- Warning: warning page (The page number will display in orange in status bar)
- Alarm: alarm page (The page number will display in red in status bar)
- Other: reserved, no use

Major Code: The major code number for an alarm page. (Not mandatory)

Minor Code: The minor code number for an alarm page. (Not mandatory)

Message Number: The warning message number for warning page. (Not mandatory)

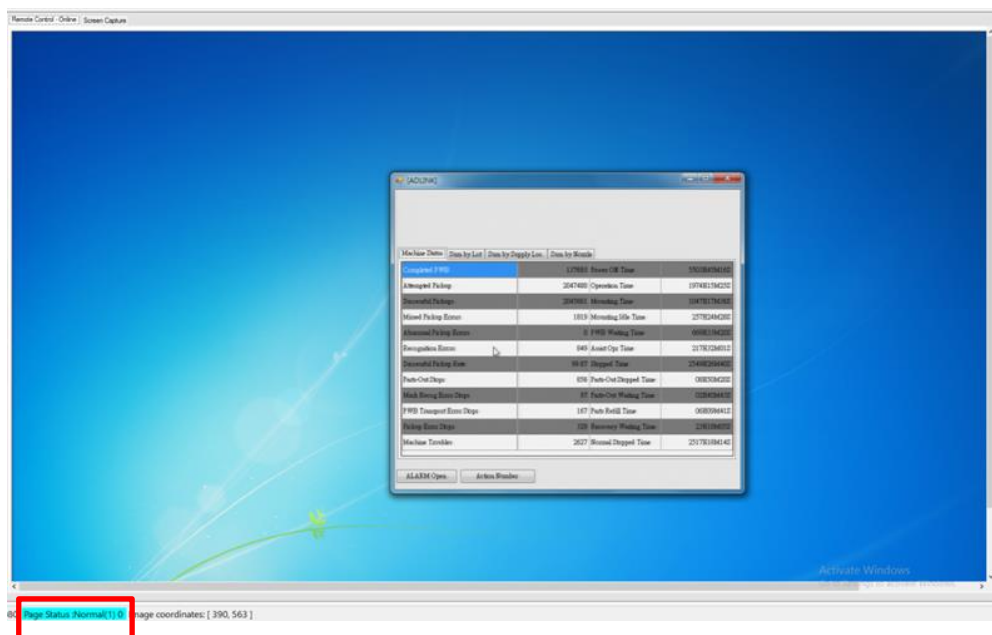
Description: Message for page. (The description will show in op screen and communication module message (DDS/RESTFUL))

Rectangle: load location information of warning image from configuration (*Note1). (Not mandatory. If you want to set Warning/Alarm Pop Out Window. Please see the step of setting in Section 7.5.

Save Page Identification Configuration: save configuration to file.

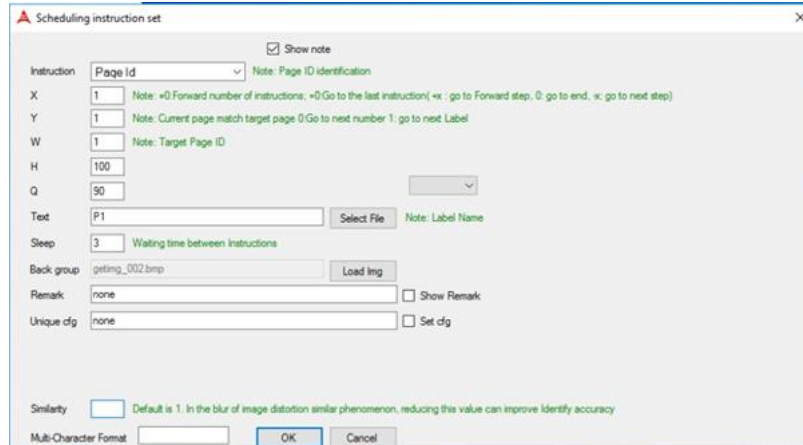
Note1

The rectangle parameter only using for Warning/Alarm Pop Out Window.



6) Use page information in script.

We modify the script in example 7.1. The script will check the page id first; if it is page 1 then go to label P1 to extract three ROIs data with OCR. If page id is 2, go to label P2 to apply OCR for another two ROIs, otherwise, for page id is 3, 4 or else, go to end.



The Threshold of PI pattern

1. The Threshold of PI pattern is a baseline of the difference in PI pattern and current image. If the difference is less than the threshold, DEX100 recognize this PI pattern, please see the following table.

Compare between the threshold (A) and the difference in PI pattern and current image (B)	
A > B	DEX100 recognize PI pattern success
A < B	DEX100 recognize PI pattern fail

That means that the larger threshold is easier to recognize the PI pattern, but it also increases the chance of recognizing the PI pattern but the image is not in actual.

2. Added an API, **Dex100_GetROIThreshold(UINT Number, UINT ROIIndex, UINT Width, UINT Height, UINT &RealThreshold, UINT &AdvisedThreshold, UINT &AdvisedThreshold_Min, UINT &AdvisedThreshold_Max)** which returns the real difference, advised threshold, min of advised threshold and max of advised threshold in this PI pattern.
3. When user creates a new PI pattern, DEX-Pro gets the current different and advised threshold value by this API.
4. Add a button "Update Page Image & Threshold" to reset all ROIs in the current page to the advised value. And DEX-pro will capture an image to replace the image layer of this page and calculate all thresholds in the page.

Note.

1. There are two key values in the advised threshold, Current difference and Dynamic Noise.

The Current difference = **RealThreshold**

Dynamic Noise = The result of Video Quality Analysis testing which is in

C:\ProgramData\ADLINK\DEX100\VideoQuality\VideoQualityStatistics.xml or 35 as default.

The minimal of advised threshold = Current difference * (1 - (Dynamic Noise/100))

The advised threshold = Current difference * (1 + ((Dynamic Noise/2)/100))

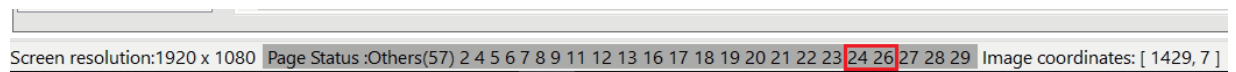
The maximal of advised threshold = Current difference * (1 + (Dynamic Noise/100))

2. The following is an example situation of fine-tune the PI pattern threshold :

Page Define Pattern		Warning/Alam Image Clip				
PageID	X	Y	WIDTH	HEIGHT	Threshold	PattemFileName
2	584	92	32	38	220	PI_Pattem10.bmp
2	455	240	112	140	131	PI_Pattem11.bmp
2	896	240	112	140	100	PI_Pattem12.bmp
2	688	536	96	140	100	PI_Pattem13.bmp
2	584	92	32	38	220	PI_Pattem14.bmp
2	584	92	32	38	220	PI_Pattem15.bmp
4	896	240	112	140	100	PI_Pattem16.bmp
4	288	536	64	140	100	PI_Pattem17.bmp
4	896	536	112	140	100	PI_Pattem18.bmp
4	1120	240	96	140	100	PI_Pattem19.bmp
4	584	92	32	38	291	PI_Pattem20.bmp
4	1120	536	96	140	100	PI_Pattem21.bmp
4	464	536	112	140	100	PI_Pattem22.bmp
4	455	240	112	140	131	PI_Pattem23.bmp
4	688	536	96	140	100	PI_Pattem24.bmp
4	286	240	64	140	254	PI_Pattem25.bmp
4	688	240	96	140	100	PI_Pattem26.bmp
4	584	92	32	38	291	PI_Pattem27.bmp
4	584	92	32	38	291	PI_Pattem28.bmp
4	584	92	32	36	299	PI_Pattem29.bmp

Assume we have a page (ID = 4) with PI pattern 16 – 29, That means the DEX-100 can identify the page 4 if all PI patterns 16 – 29 are recognized.

If the page identify failed somehow, please check the page status of DEX-pro after connecting, it shows what are patterns recognized.



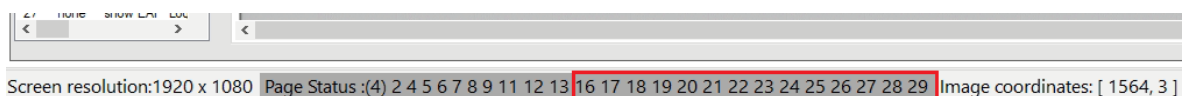
There is no 25 in the Page Status, it means the DEX-100 fail to recognize PI pattern 25.

Please adjust the threshold of PI Pattern 25 to larger one Or click the button “Update Page Image & Threshold” to reset all ROIs in the page to the advised value and try again.

Page Define Pattern		Warning/Alam Image Clip				
PageID	X	Y	WIDTH	HEIGHT	Threshold	PattemFileName
2	584	92	32	38	220	PI_Pattem10.bmp
2	455	240	112	140	131	PI_Pattem11.bmp
2	896	240	112	140	100	PI_Pattem12.bmp
2	688	536	96	140	100	PI_Pattem13.bmp
2	584	92	32	38	220	PI_Pattem14.bmp
2	584	92	32	38	220	PI_Pattem15.bmp
4	896	240	112	140	100	PI_Pattem16.bmp
4	288	536	64	140	100	PI_Pattem17.bmp
4	896	536	112	140	100	PI_Pattem18.bmp
4	1120	240	96	140	100	PI_Pattem19.bmp
4	584	92	32	38	291	PI_Pattem20.bmp
4	1120	536	96	140	100	PI_Pattem21.bmp
4	464	536	112	140	100	PI_Pattem22.bmp
4	455	240	112	140	131	PI_Pattem23.bmp
4	688	536	96	140	100	PI_Pattem24.bmp
4	286	240	64	140	100	PI_Pattem25.bmp
4	688	240	96	140	100	PI_Pattem26.bmp
4	584	92	32	38	291	PI_Pattem27.bmp
4	584	92	32	38	291	PI_Pattem28.bmp
4	584	92	32	36	299	PI_Pattem29.bmp



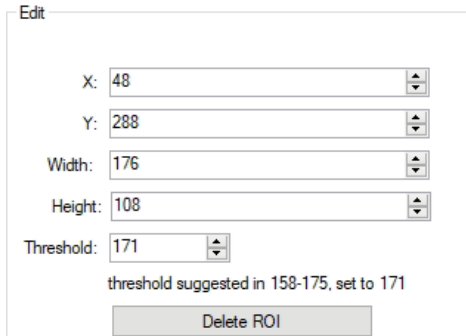
Page Define Pattern		Warning/Alam Image Clip				
PageID	X	Y	WIDTH	HEIGHT	Threshold	PattemFileName
2	584	92	32	38	220	PI_Pattem10.bmp
2	455	240	112	140	131	PI_Pattem11.bmp
2	896	240	112	140	100	PI_Pattem12.bmp
2	688	536	96	140	100	PI_Pattem13.bmp
2	584	92	32	38	220	PI_Pattem14.bmp
2	584	92	32	38	220	PI_Pattem15.bmp
4	896	240	112	140	100	PI_Pattem16.bmp
4	288	536	64	140	100	PI_Pattem17.bmp
4	896	536	112	140	100	PI_Pattem18.bmp
4	1120	240	96	140	100	PI_Pattem19.bmp
4	584	92	32	38	291	PI_Pattem20.bmp
4	1120	536	96	140	100	PI_Pattem21.bmp
4	464	536	112	140	100	PI_Pattem22.bmp
4	455	240	112	140	131	PI_Pattem23.bmp
4	688	536	96	140	100	PI_Pattem24.bmp
4	286	240	64	140	254	PI_Pattem25.bmp
4	688	240	96	140	100	PI_Pattem26.bmp
4	584	92	32	38	291	PI_Pattem27.bmp
4	584	92	32	38	291	PI_Pattem28.bmp
4	584	92	32	36	299	PI_Pattem29.bmp



DEX100 identify page 4 successfully.

Setup steps

1. Sets the output image of target machine to the page which is been identified.
2. Create a new PI pattern, DEX-Pro will show the advised threshold and update the threshold automatically.



Edit

X: 48

Y: 288

Width: 176

Height: 108

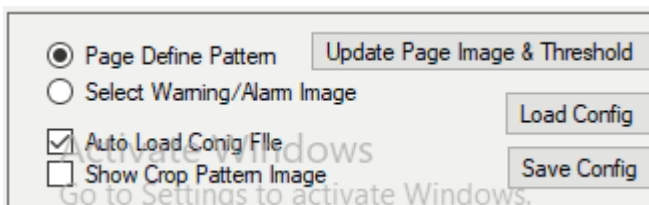
Threshold: 171

threshold suggested in 158-175, set to 171

Delete ROI

When there is no signal input, DEX-pro shows “Please check signal” on UI and stop advising threshold value.

3. After creates all RIOs in this page, press “Save Config ” to save data.
4. When the source image changed (ex. change target) or the DEX-100 identifies wrong Page, press “Reset all RIOs in this page” to set all thresholds of RIOs in this page to the advised value.



Page Define Pattern Update Page Image & Threshold

Select Warning/Alarm Image Load Config

Auto Load Conig File Save Config

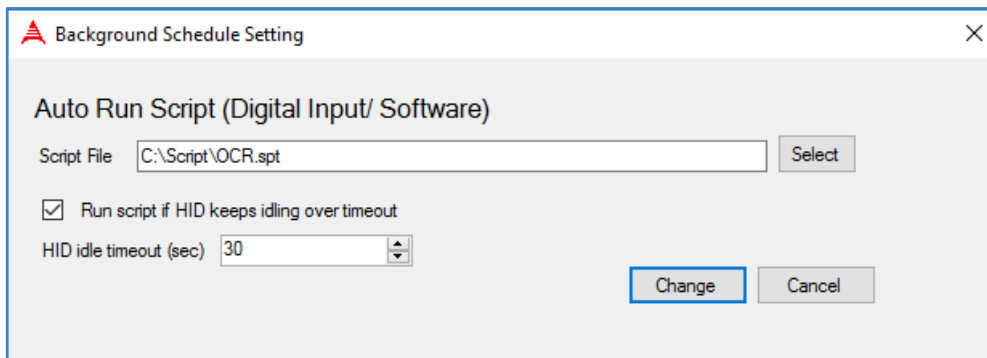
Show Crop Pattern Image

DEX-pro pups up a message to remind user that makes sure the target machine’s image is the same page as setting or the advised threshold value will be wrong.

7.4. MSMQ Example for switching different script

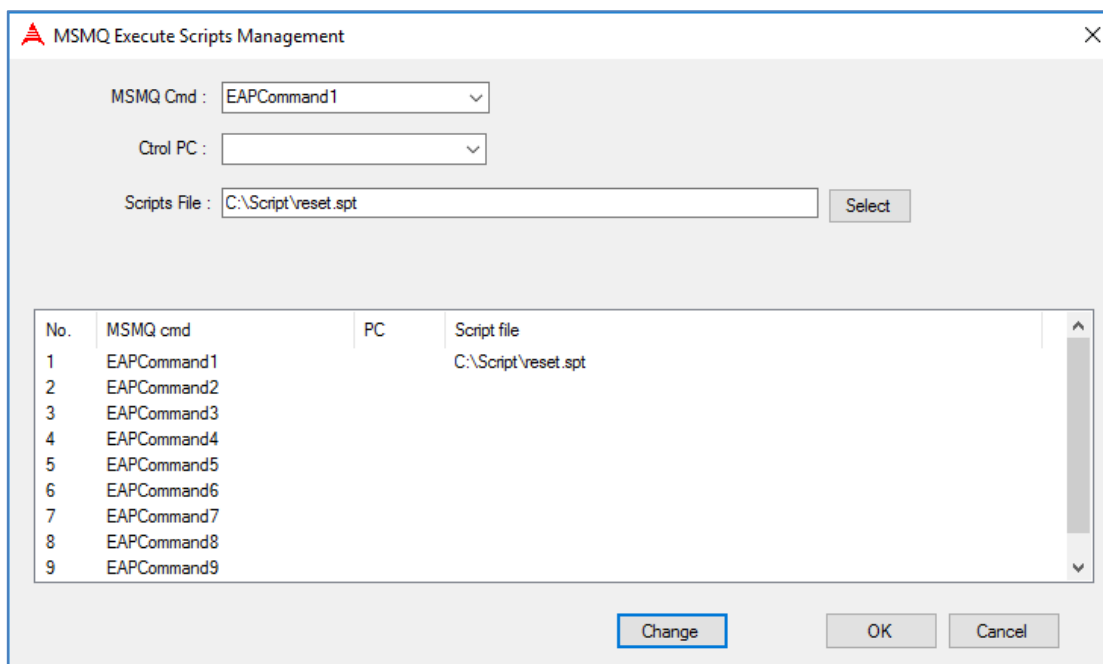
In this example, we have a general script to extract data from host machine. When receiving a specific MSMQ event, we reset host machine. Restart to extract data after resetting.

- 1) Prepare one script, OCR.spt for data extraction and one script, reset.spt for reset host machine.
- 2) Set OCR.spt as the main script and enable run script when HID timeout. See section 3.12 for more description of **Background Schedule Setting**.



3) Set MSMQ Execute Scripts Management

Select reset.spt for the first command, EAPCommand1.



4) Click Start(Auto) to run OCR.spt

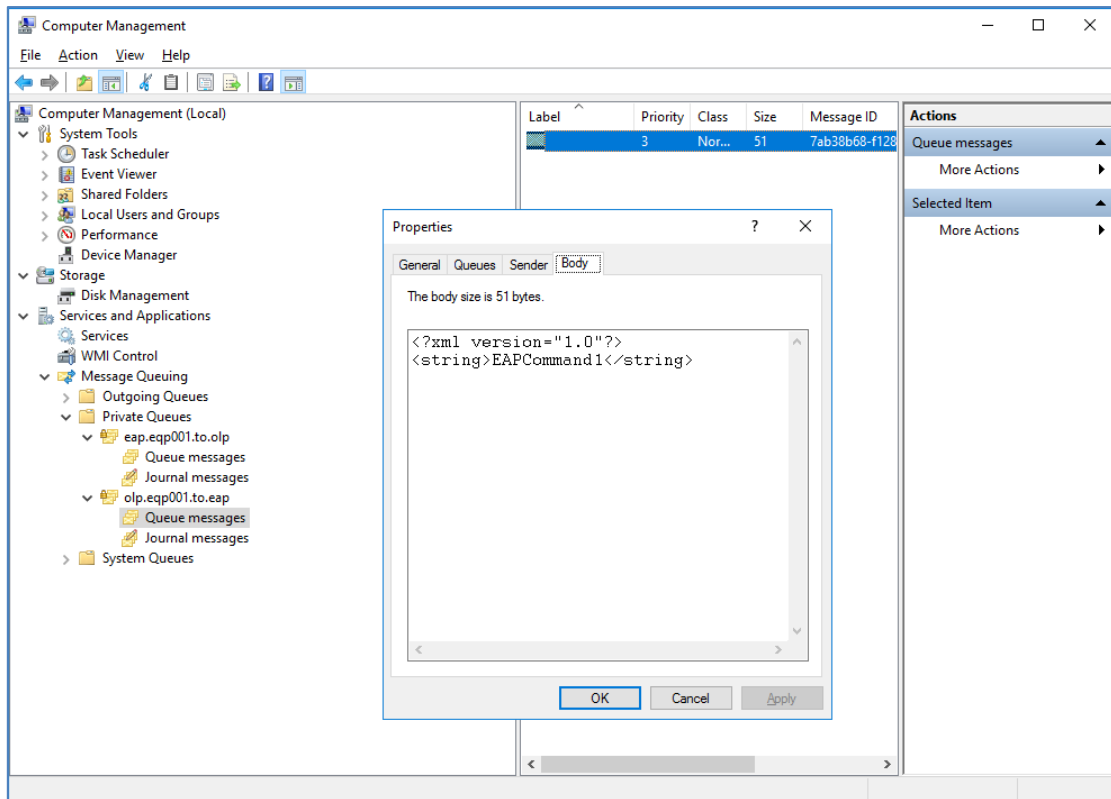
5) Send MSMQ to OLP.EQP001.To.EAP with message "EAPCommand1" with external utility. In this case we use msmqmng (http://msmqmng.codeplex.com/).

```

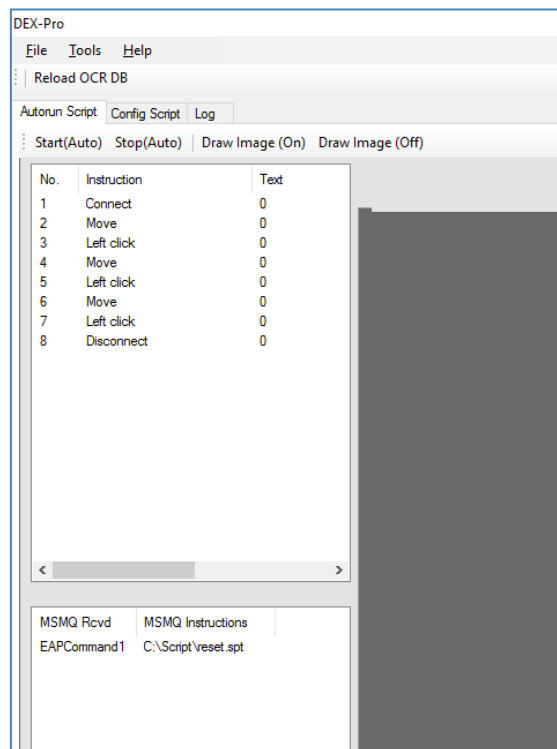
C:\Windows\system32\cmd.exe
MSMQ Management Console 1.1.6836.29738
MSMQ>send /p .\private$\OLP.EQP001.To.EAP /m "<?xml version='1.0'?><string>EAPCommand1</string>"
Complete in 00:00:00.0318509
MSMQ>

```

The message in Windows' Computer Management showed below.



6) When Dex-Pro receives the message, it will stop OCR.spt and execute reset.spt for reset procedure. The left-bottom panel in Autorun Script will show the received message and corresponded script.



7) 30 Sec after finish reset.spt, Dex-100 will restart data extraction.

7.5. MSMQ Example for getting/setting OCR

table value

In this example, we show how to access the OCR table value by MSMQ command. There are two MSMQ command "EAPSetEC" and "EAPQueryEC". If you want to use these two MSMQ commands to access the DEXPro OCR table value. You need to write a MSMQ program to communicate with DEXPro. Remember if you want to send the message in your program, it will need to modify character for some reserved word on XML. E.g. < to replace <. These two commands format are as follow,

EAPSetEC:

```
<Transaction Name="EAPSetEC" TID="2177" Type="Request" DateTimeSent="2019/12/09
01:11:27" DateTimeReceived="0001/01/01 00:00:00.0000000">
  <ECItem>
    <ECID>10</ECID><ECValue>aaa</ECValue>
  </ECItem>
  <ECItem>
    <ECID>20</ECID><ECValue>bbbb</ECValue>
  </ECItem>
</Transaction>
```

ECID is the OCR table index and ECValue is that you want to set or modify. Moreover, reply message is

```
<Transaction Name="EAPSetEC" TID="2177" Type="Reply" DateTimeSent="2019/12/09
01:11:59" DateTimeReceived="0001/01/01 00:00:00.0000000">
  <ErrorCode>0</ErrorCode><ErrorText></ErrorText>
</Transaction>
```

You can check ok if the error code is successful.

EAPQueryEC:

```
<Transaction Name="EAPQueryEC" TID="2178" Type="Request" DateTimeSent="2019/12/09
01:11:27" DateTimeReceived="0001/01/01 00:00:00.0000000">
  <ECItem>
    <ECID>10</ECID>
    <ECID>20</ECID>
  </ECItem>
</Transaction>
```

ECID is the OCR table index that you want to query. Moreover, reply message is
<Transaction Name="EAPQueryEC" TID="2178" Type="Reply" DateTimeSent="2019/12/09
01:11:59" DateTimeReceived="\0001/01/01 00:00:00.0000000">

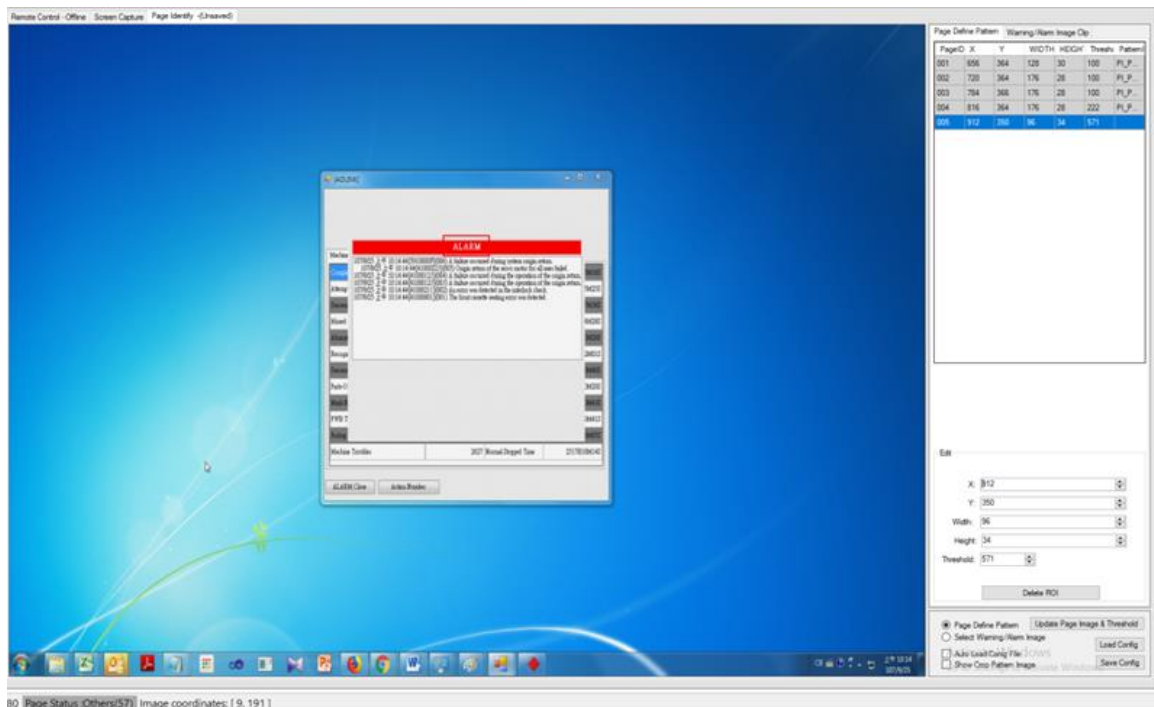
```
<ECItem>
  <ECID>10</ECID><ECValue>aaa</ECValue>
</ECItem>
<ECItem>
  <ECID>20</ECID><ECValue>bbbb</ECValue>
</ECItem>
<ErrorCode>0</ErrorCode><ErrorText></ErrorText>
</Transaction>"
```

You can get the value between the ECValue tag and check ok if the error code is successful.

7.6. Warning/Alarm (Pop Out Window) setting flow

This example will demonstrate the identification of warning page and displayed warning page on OP Screen when it is detected. In example 7.3, there are 4 normal pages, one for each tab. In this example, in addition with the original normal pages, one message box as a warning page will be included.

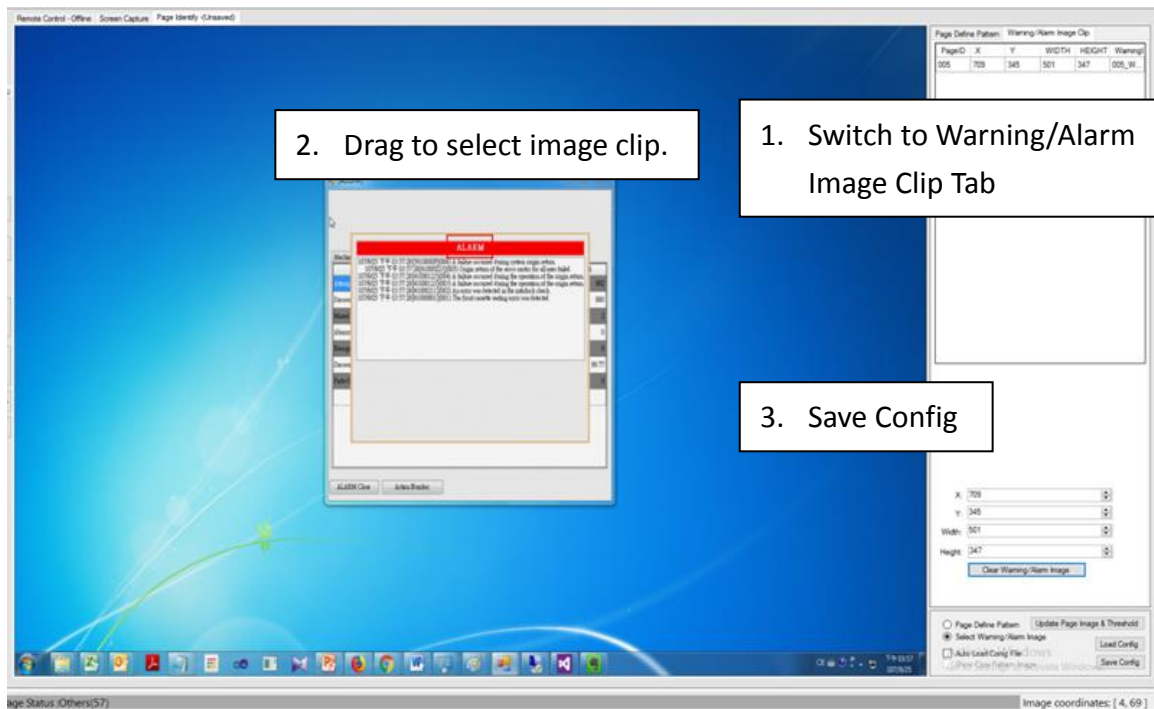
- Open page identification editor select pattern of the 5th page. Page 1-4 are the same as example 7.3.



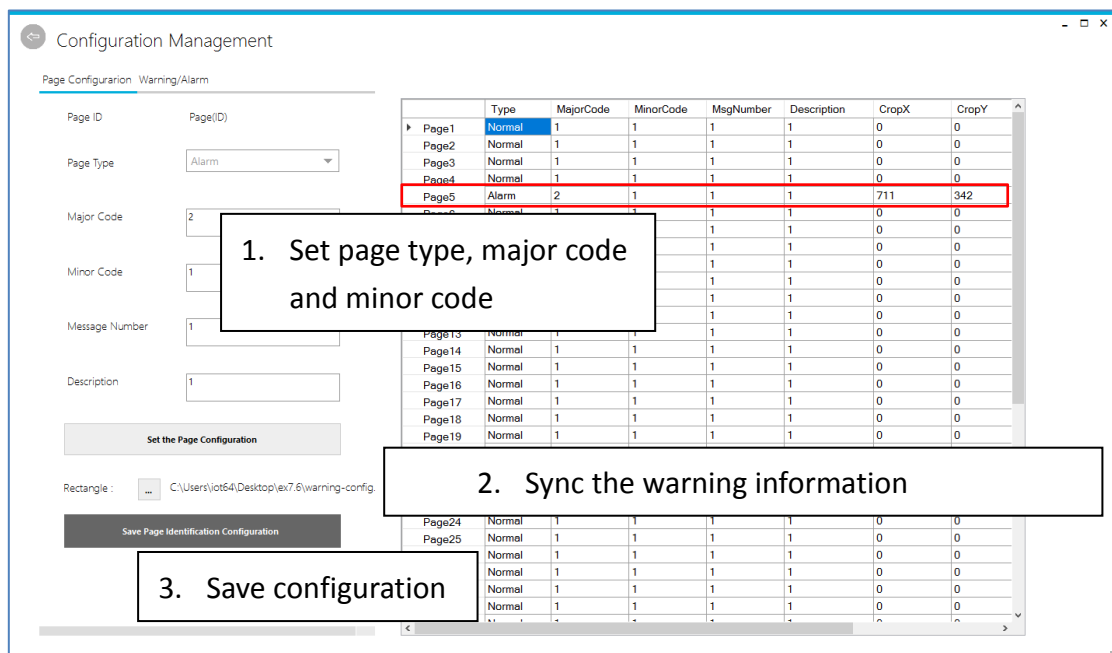
- Switch right panel to *Warning/Alarm Image Clip*. Drag mouse on screen shot image to select warning/alarm clip which will be display on the OP Screen when warning page is identified. The selection area will be marked with orange rectangle. You can see the relevant parameters displayed in the table in the upper right corner. Then, the orange rectangle parameter save (X/Y/WIDTH/HEIGHT). Click “Save Config” button. The “orange rectangle parameter” will map to page configuration “rectangle” parameter (CropX/CropX/width/height) *Note1.

Note1

- The rectangle parameters are saving in warning-config XML format.
- Only the warning and alarm pages can set the pop out window. This function is not mandatory and the user can not set it.

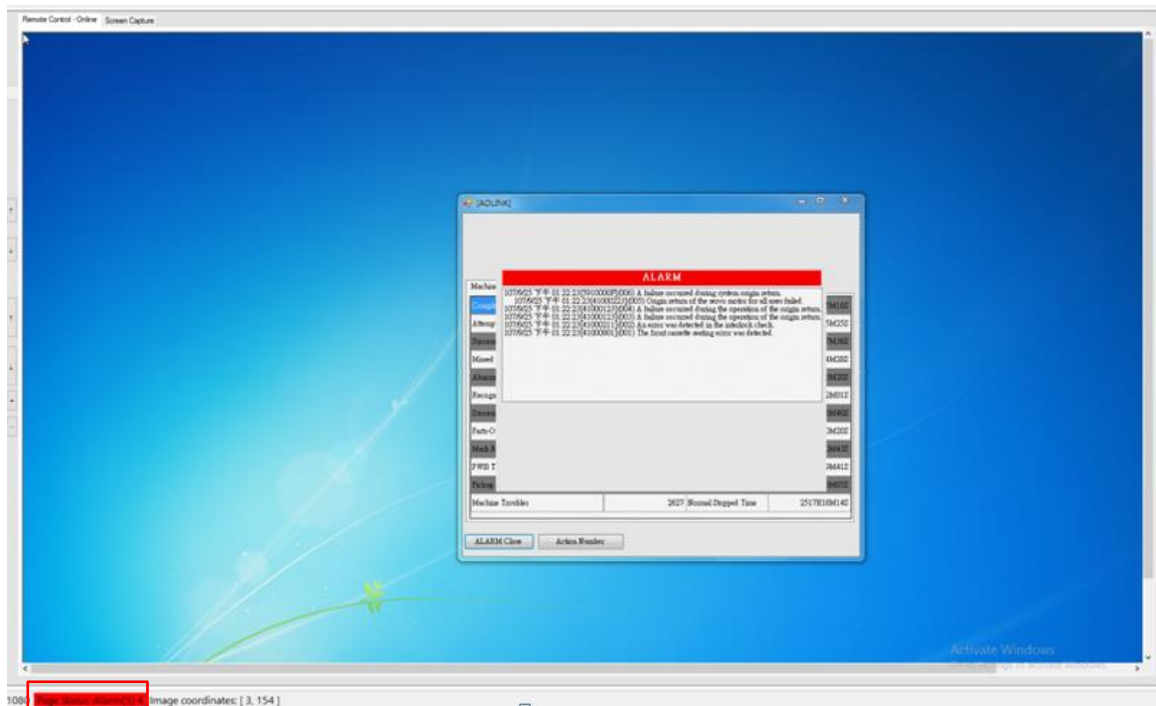


- Set page type for page 5.
Open page identification setting (Tools -> Configuration Management -> Page Identification page configuration). Set page type, major code and minor code to Alarm, 2, and 1 respectively for page 5.
Note if it is an alarm page, you need to assign code and minor code, and for warning page you need to assign message number and the description, see Section 3.1.2 for more details. And remember to sync the warning-config.xml, you need to load by clicking the “...” on the Rectangle label right side. After loading the warning-config.xml, click “Save configuration” again.



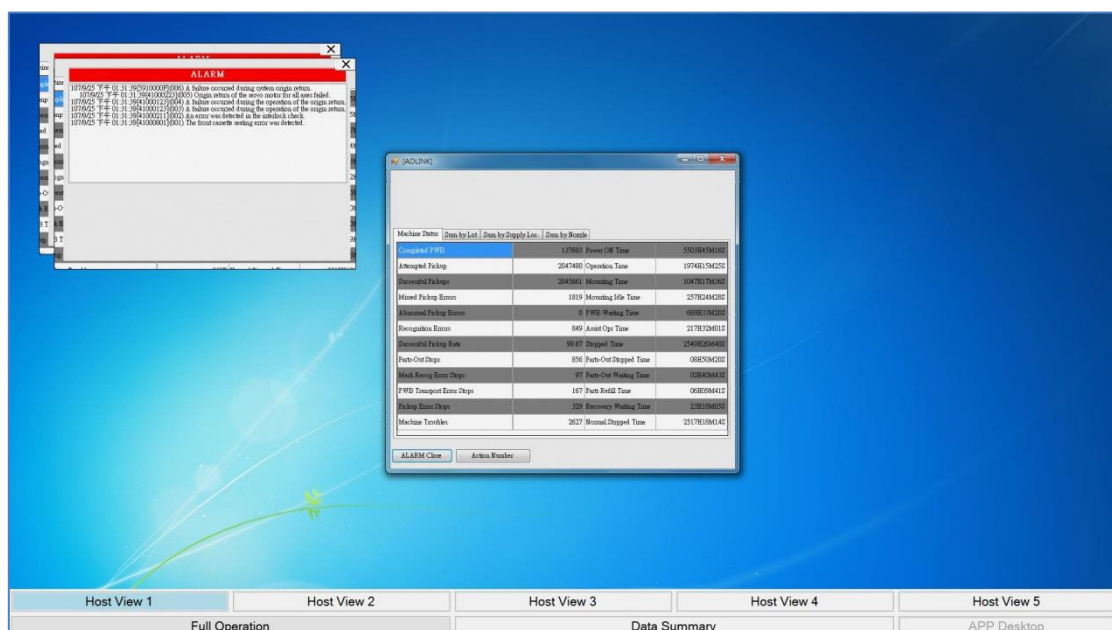
- Load and run script in example 7.3

When main program identifies the alarm page, the main program status bar shows “Alarm” with page id in red background color (orange background color for warning page).



- Alarm images on OP Screen.

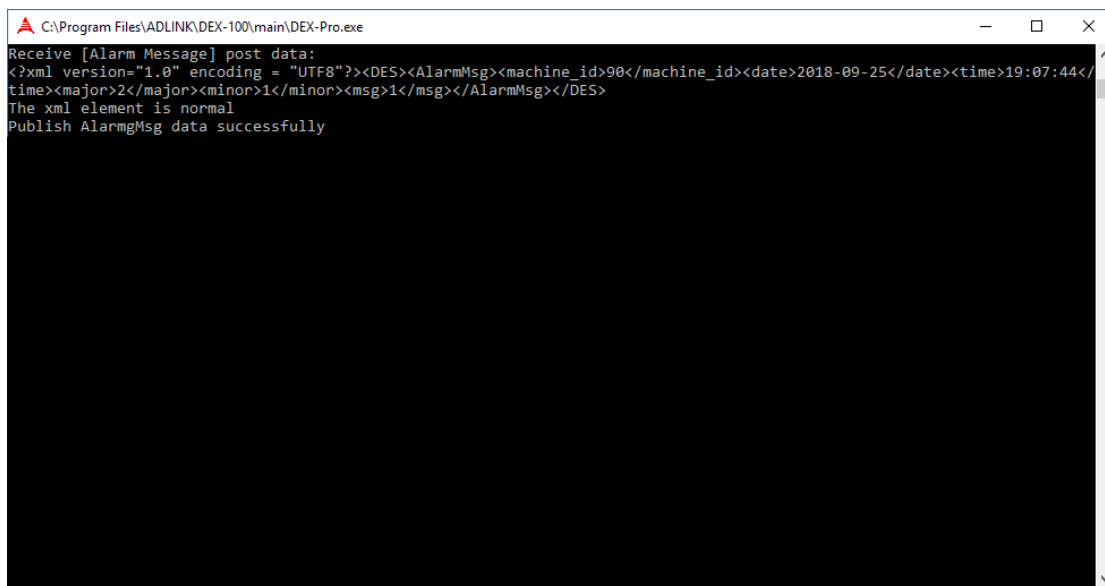
The alarm image will be displayed on OP Screen. Each time the alarm page is detected, the alarm images will be showed. For example, the figure below showed OP Screen with two alarm images. User needs to remove the image by click on it otherwise OP panel will be disabled. The “**detection rate (*Note1)**” and “**maximum images**” can be showed on OP Screen are configurable. They can be set on “Tools -> Configuration Management -> Page Identification page configuration -> Warning/Alarm -> Update Rate” and “Tools->Config->OP Screen Setting -> Max warning images displayed”, respectively. See Section 3.1.2 for more details.



Note1

Because the window of the warning page may stay for many seconds, in order to avoid the pop out windows of warning /alarm being quickly generated, the window of the same page will be updated according to the detection rate. (default is 5 second)

- If DDS or Restful module is activated the alarm code will be sent to remote server and logged on the console. The configuration of DDS/Restful server is under Tools->Config -> Configuration Management -> DDS & REST OCR Configuration. See more details for setting communication module in section 3.1.2.

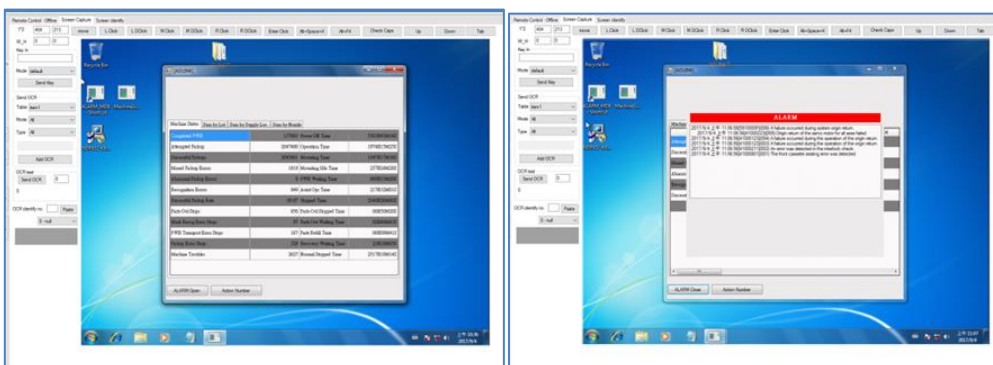


```
C:\Program Files\ADLINK\DEX-100\main\DEX-Pro.exe
Receive [Alarm Message] post data:
<?xml version="1.0" encoding = "UTF8"?><DES><AlarmMsg><machine_id>90</machine_id><date>2018-09-25</date><time>19:07:44</time><major>2</major><minor>1</minor><msg>1</msg></AlarmMsg></DES>
The xml element is normal
Publish AlarmMsg data successfully
```

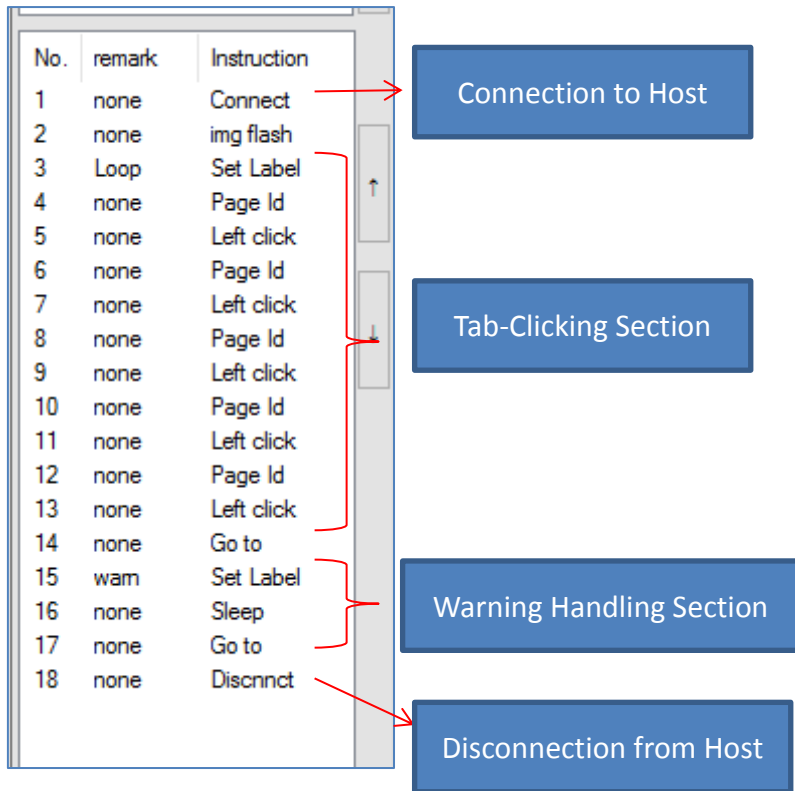
7.7. Script Examples

Example 1: Pl.spt

This script repeatedly clicks 4 tab pages in sequence. If warning message is displayed, the script wait until warning message is closed. After warning message is closed, script goes back to clicking task.



Script Instructions:



Instruction Description

#1 Connect

Connect to host machine.

#3 Set Label

Set a label named "Loop", for repeat clicking

#4-#13

Click each tab in sequence and if a warning page is identified then jump to warning label (#15) to sleep.

Scheduling instruction set

Show note

Instruction: **Page Id** Note: Page ID identification

X: Note: ≠0:Previous number of instructions; =0:Go to the last instruction(+x : go to previous step, 0: go to end, -x: go to next step)

Y: Note: Current page match target page 0:Go to next number 1: go to next Label

W: Note: Target Page ID

H:

Q:

Text: Note: Label Name

Sleep: Waiting time between instructions, this is the multiple of Time Stop

Back group:

Remark: Show Remark

Similarity: Default is 1. In the blur of image distortion similar phenomenon, reducing this value can improve Identify accuracy

Multi-Character Format:

Detail settings of instruction #4 for page identification: The warning page is set with id = 4. Thus the setting, Y = 1, W = 4, Text = “warn”, means if current page id = 4 (it is warning page), then jump to the instruction labeled with “warn”.

Scheduling instruction set

Show note

Instruction: **Left click**

X: Note: Cursor coordinates x

Y: Note: Cursor coordinates y

W: Note: Cursor Detection Enable, 1:Enable, Default: is disable

H:

Q:

Text:

Sleep: Waiting time between instructions, this is the multiple of Time Stop

Back group:

Remark: Show Remark

Similarity: Default is 1. In the blur of image distortion similar phenomenon, reducing this value can improve Identify accuracy

Multi-Character Format:

Detail setting of instruction #5: Send a left click event to host at X=254, Y=631 to click 1st tab page.

Scheduling instruction set [X]

Show note

Instruction: **Go to** Note: next step

X: Note: =0:Previous number of instructions; =0:Go to the last instruction(+x : go to previous step, 0: go to end, -x: go to next step)

Y: Note: 0:Go to next number 1: go to next Label

W:

H:

Q:

Text: Select File Note: Label Name

Sleep: Waiting time between Instructions, this is the multiple of Time Stop

Back group: Load Img

Remark: Show Remark

Similarity: Default is 1. In the blur of image distortion similar phenomenon, reducing this value can improve Identify accuracy

Multi-Character Format:

Detail setting of instruction #14: Go to the instruction with label loop.

Example 2: OCR.spt

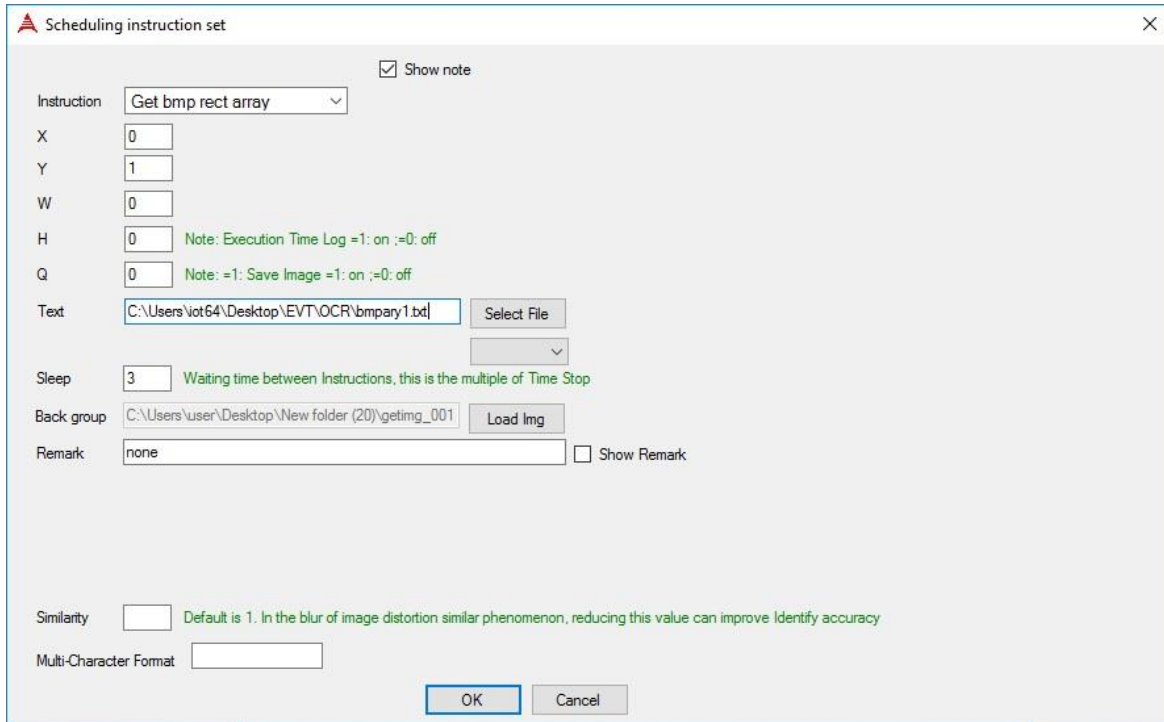
Repeatedly extract value from screen by OCR function and save and upload selected OCR results to server.

No.	remark	Instruction
1	none	Connect
2	none	Set Label
3	none	img flash
4	none	Get bmp rect...
5	none	MSG_SAVE...
6	none	Go to
7	none	Discrinct

OCR Section

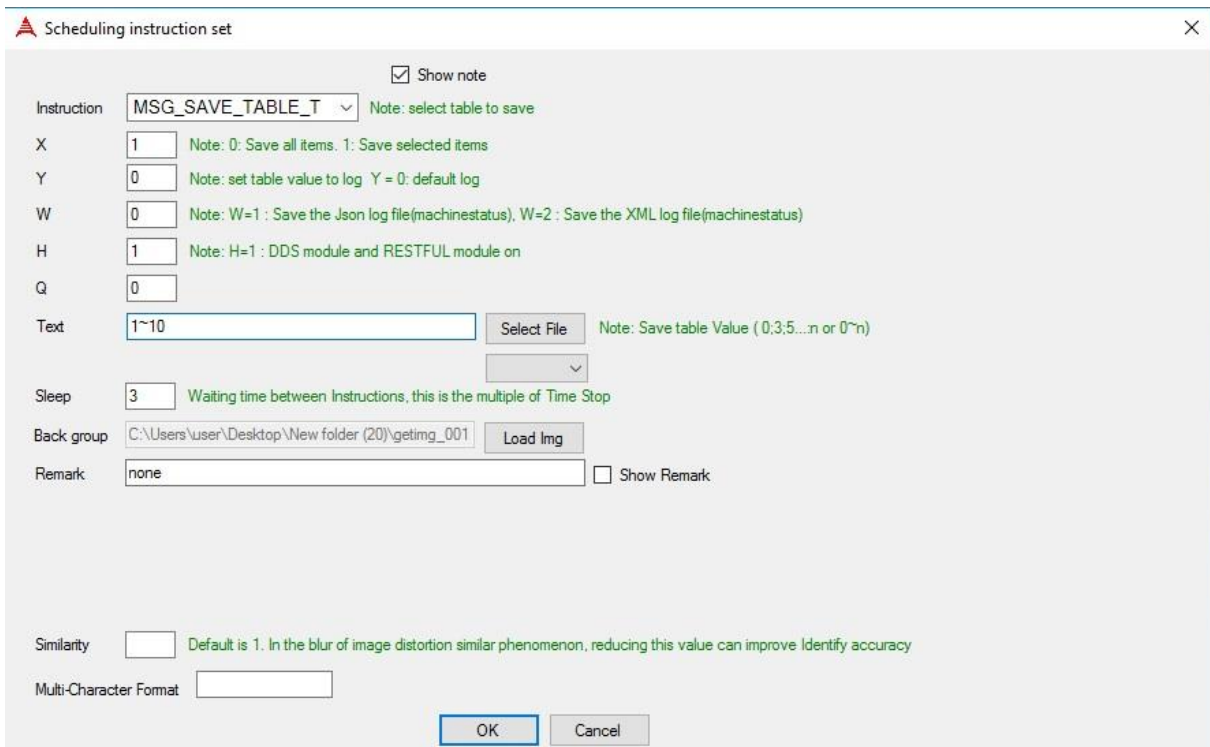
Instruction Description

#4 Get bmp rect array: Applied OCR function to ROIs of current image, then save the result to data tables. See OCR section for more details.



#5 MSG_SAVE_TABLE_TO_LOG

Save data table to log file.

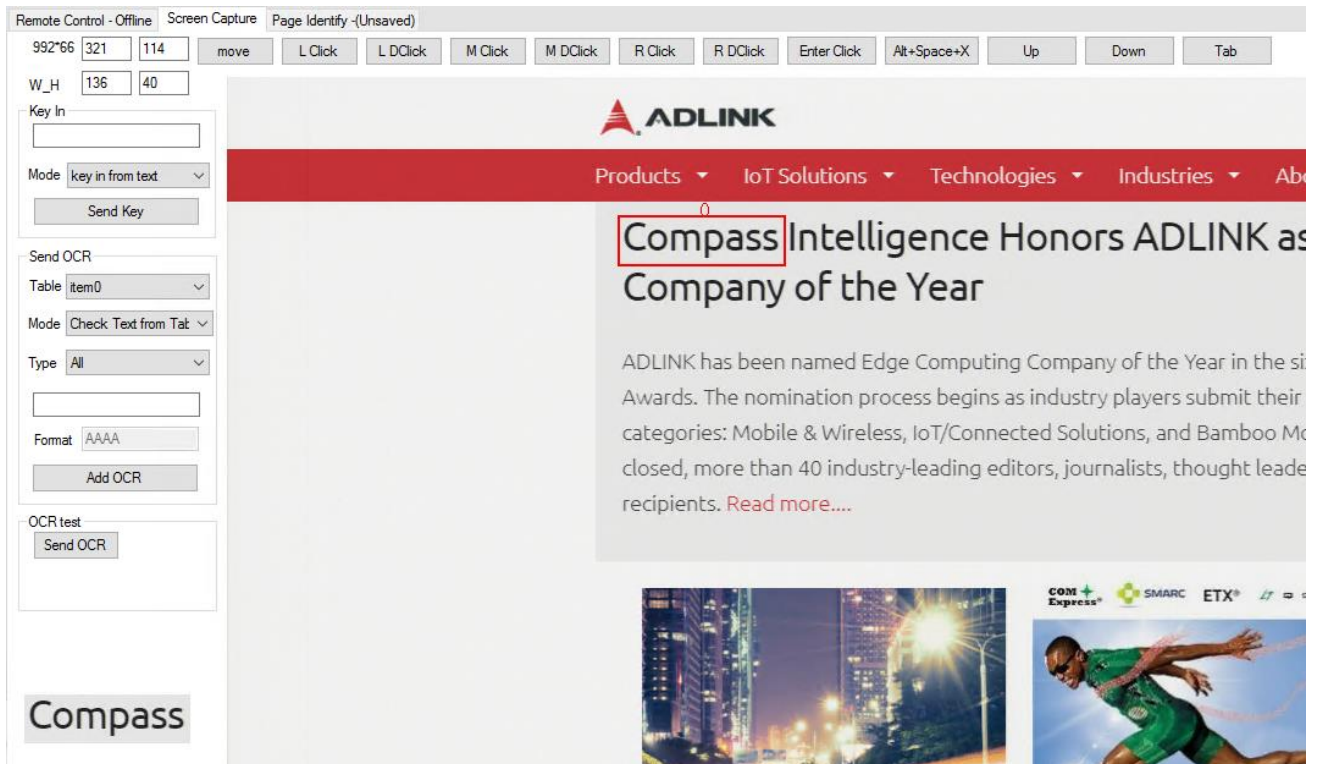


Detail settings of instruction #5 for saving data to log file: The setting Text = 1~10 selects Item 1 -10 to be saved, the rest of items will be ignored. The setting H = 1 upload data value of selected items in string format to server using DDS

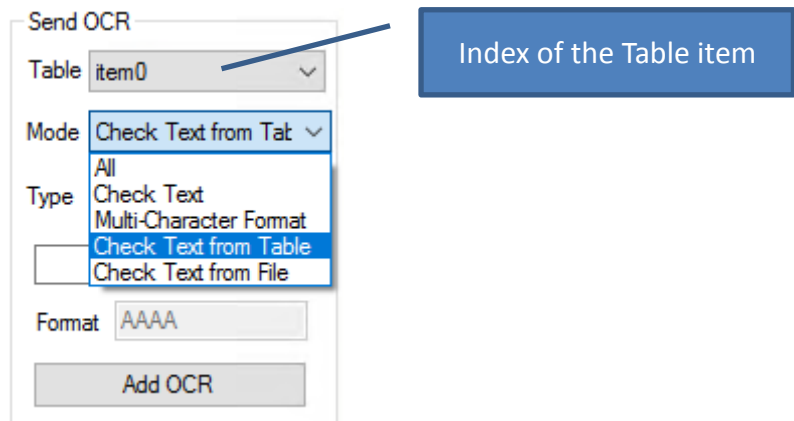
module.

Example 3-1: TableCompare1.spt

Just like the Mode “Check Text” described above, there are two compare mode called “Check Text from Table” and “Check Text from File”. In this example, we describe about the “Check Text from Table” and you can figure out the “Check Text from File” in the next example. Select the OCR ROI first:



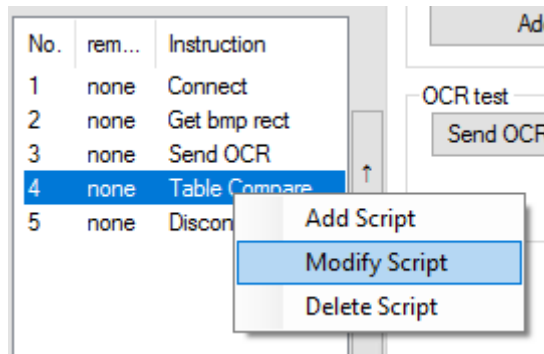
All the steps are the same with Example 3-1 and the only difference is the Mode you need to change to “Check Text from Table” just like:



After change Mode to “Check Text from Table”, you do not need to input the Text for matching before press the Add OCR button. The compare mechanism is based on the settings about the table. Here you can see the instruction called “Table Compare” comes after the instruction “Send OCR”, like below:

No.	rem...	Instruction
1	none	Connect
2	none	Get bmp rect
3	none	Send OCR
4	none	Table Compare
5	none	Disconnect

Then focusing on "Table Compare" and right click for the pop up menu to modify the script, like below:



The detail settings of the instruction #4 "Table Compare" form showed up. Type the compare result into the quotation mark, in this Example we type "Compass" (blue arrow). Choose the Table index which you want to compare from the table, in this example our index is 0 (red arrow). More detail settings you can reference to 5.2 Script Instruction Description.

Scheduling instruction set ✕

Show note

Instruction: Table Compare Note: Table Compare

X: Note: Text compare succeed. +x:go to Forward steps; =0:Go to the last instruction; -x:go to next steps

Y: Note: Text compare failed. +y:go to Forward steps; =0:Go to the last instruction; -y:go to next steps

W:

H:

Q:

Text: Table(0) == "Compass" Select File Note: Compare expression.
Table(i): retrieve table item i, e.g., Table(0)=="ABC"
ReadFile(path): read file from path e.g., Table(0)==ReadFile("C:\input.txt")
Num(str): convert str to number e.g., Num(Table(0)) >= 12.3

Sleep: Waiting time between Instructions, this is the multiple of Time Stop

Back group: getimg_001.bmp Load Img

Remark: Show Remark

Unique cfg: Set cfg

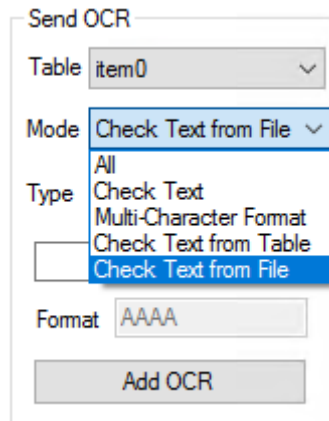
Similarity: Default is 1. In the blur of image distortion similar phenomenon, reducing this value can improve Identify accuracy

Multi-Character Format:

OK Cancel

Example 3-2: TableCompare2.spt

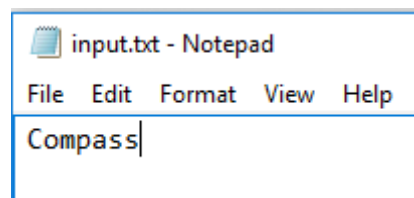
In this Example, the difference between “Check Text from Table” is changing the Mode to “Check Text from File” before pressing the “Add OCR” button.



The added instruction is also called “Table Compare” comes after the instruction “Send OCR”, like below:

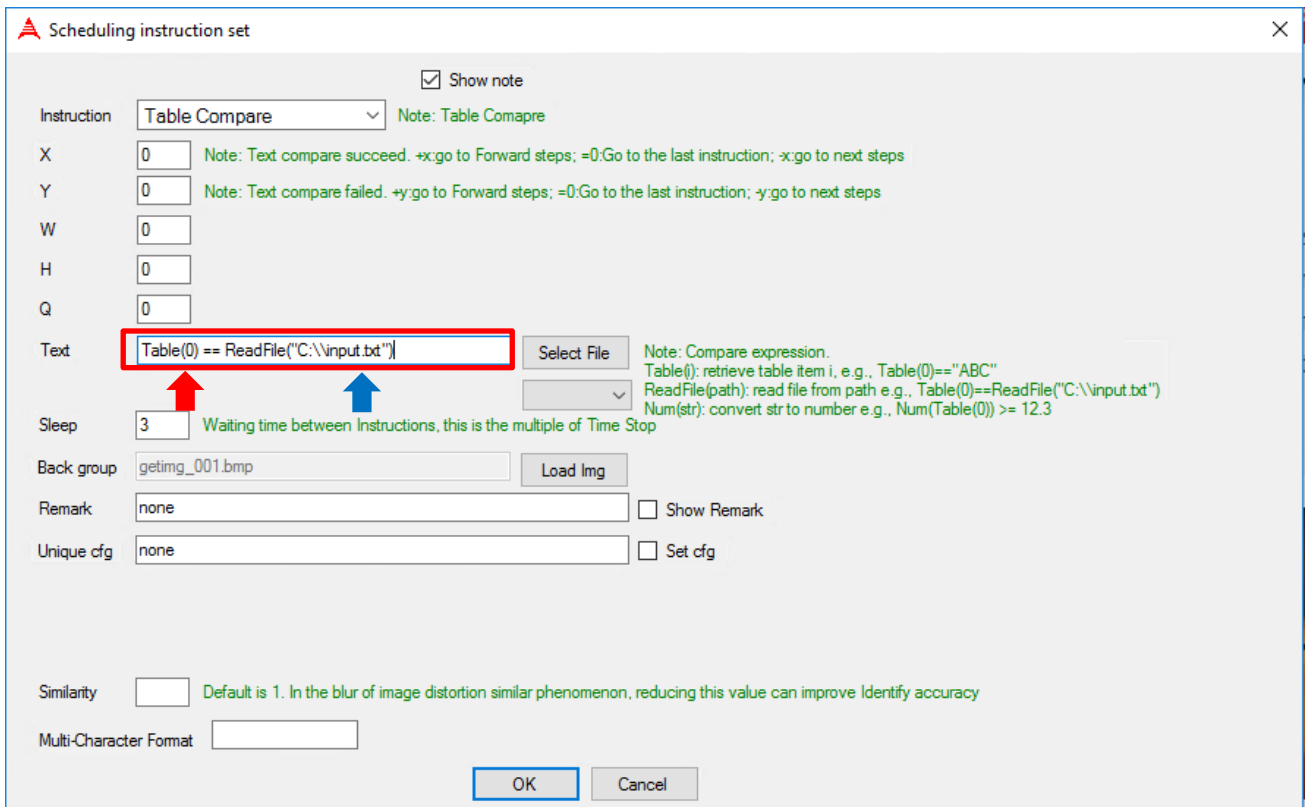
No.	rem...	Instruction
1	none	Connect
2	none	Get bmp rect
3	none	Send OCR
4	none	Table Compare
5	none	Disconnect

Prepare the result file from the disk and the content which looks like:



In this example, we save in drive C: and named it “input.txt”. Notice that the file cannot exist any carriage return and line feed which means there only exist single row in the txt file.

The detail settings of the instruction #4 “Table Compare” form showed up. Type the compare file path into the quotation mark, in this Example we provide the file path: “C:\input.txt” (blue arrow). Choose the Table index which you want to compare from the table, in this example our index is 0 (red arrow). More detail settings you can reference to 5.2 Script Instruction



Example 4 ScreenCalibration.spt

Screen calibration instruction is used to calibrate horizontal shift within ± 3 pixels. This example set a label named "DoCab" (instruction #4) for the following screen shift calibration (instruction #7). If calibration failed, it will jump back to "DoCab". The script will count trial number using "set Table Value" (instruction # 5) and continuously try calibration if it is less than maximum trial number (instruction #6).

Note the calibration is done with page identification patterns, in others words, if there is no page identification pattern, this instruction will result in fail.

No.	rem...	Instruction
1	none	Connect
2	none	img refresh
3	none	set Table Value
4	none	Set Label
5	none	set Table Value
6	none	Table Compare
7	none	Screen Shift Cab
8	none	Move
9	none	Move
10	none	Move
11	none	Disconnect

Instruction Description

#3 set Table Value

Scheduling instruction set [X]

Show note

Instruction: **set Table Value** Note: Set Table value

X: Note: table number

Y: Note: = : +x : go to Forward step, 0: go to end, -x: go to next step

W: Note: > : +x : go to Forward step, 0: go to end, -x: go to next step

H: Note: < : +x : go to Forward step, 0: go to end, -x: go to next step

Q: Note: Matching mode: 0: set value, 1: number Match, 2: word Match, 3: value del value, 4: value add value, 5: comp float value, 6: set any panle table value

Text: Note: Value

Sleep: Waiting time between Instructions, this is the multiple of Time Stop

Back group:

Remark: Show Remark

Unique cfg: Set cfg

Similarity: Default is 1. In the blur of image distortion similar phenomenon, reducing this value can improve Identify accuracy

Multi-Character Format:

Detail settings of instruction #3 set Table Value: reset counter by set item0 to 0.

Scheduling instruction set [X]

Show note

Instruction: **Set Label**

X:

Y:

W:

H:

Q:

Text:

Sleep: Waiting time between Instructions, this is the multiple of Time Stop

Back group:

Remark: Show Remark

Similarity: Default is 1. In the blur of image distortion similar phenomenon, reducing this value can improve Identify accuracy

Multi-Character Format:

Detail settings of instruction #4 Set Label: set a label named "DoCab" as the section of screen shift cablication.

Scheduling instruction set

Show note

Instruction: **set Table Value** Note: Set Table value

X: Note: table number

Y: Note: = : +x : go to Forward step, 0: go to end, -x: go to next step

W: Note: > : +x : go to Forward step, 0: go to end, -x: go to next step

H: Note: < : +x : go to Forward step, 0: go to end, -x: go to next step

Q: Note: Matching mode: 0: set value, 1: number Match, 2: word Match, 3: value del value, 4: value add value, 5: comp float value, 6: set any panle table value

Text: Note: Value

Sleep: Waiting time between Instructions, this is the multiple of Time Stop

Back group:

Remark: Show Remark

Unique cfg: Set cfg

Similarity: Default is 1. In the blur of image distortion similar phenomenon, reducing this value can improve Identify accuracy

Multi-Character Format:

Detail settings of instruction #5 set Table Value: item0 will plus 1 by with setting Q=4 and Text = 0.

Scheduling instruction set

Show note

Instruction: **Table Compare** Note: Table Comapre

X: Note: Text compare succeed. +x:go to previous steps; =0:Go to the last instruction; -x:go to next steps

Y: Note: Text compare failed. +y:go to previous steps; =0:Go to the last instruction; -y:go to next steps

W:

H:

Q:

Text: Note: Compare expression.
Table(i): retrieve table item i, e.g., Table(0)=="ABC"
ReadFile(path): read file from path e.g., Table(0)==ReadFile("C:\input.txt")
Num(str): convert str to number e.g., Num(Table(0)) >= 12.3

Sleep: Waiting time between Instructions, this is the multiple of Time Stop

Back group:

Remark: Show Remark

Similarity: Default is 1. In the blur of image distortion similar phenomenon, reducing this value can improve Identify accuracy

Multi-Character Format:

Detail settings of instruction #6 Table Compare: If Item0 < 3, script will go to instruction #7 to do calibration, otherwise it goes to instruction #8.

Detail settings of instruction #7 Screen Shift Cab: perform screen calibration. If calibration failed it goes to label “DoCab”.

OCR alphabet and number identification

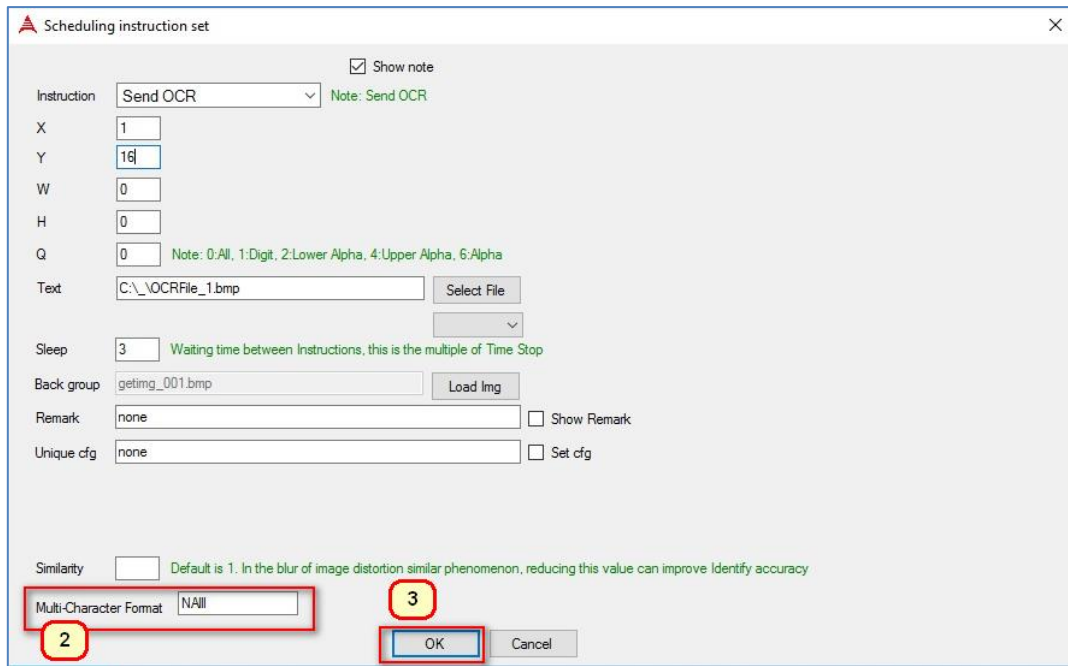
This function allows users to set the OCR format on 5 types in the edit phase and in the extraction phase, the OCR will follow this setting character format type to interpret the corresponded alphabet or number.

Dex-Pro (Asi-OCR)

- Edit Mode – Add a new ROI item
- 2) Choose the Mode to “Multi-Character Format” in the “Send OCR” block.
- 3) Key in the character type for every character one by one, and the character format type is as follow:
 - 1) A: all
 - 2) N: Number
 - 3) L: Uppercase letter
 - 4) l: Lowercase letter
 - 5) W: Uppercase and Lowercase letter

For example, if the ROI have 5 characters, we can set NAlll in the Format Text Box

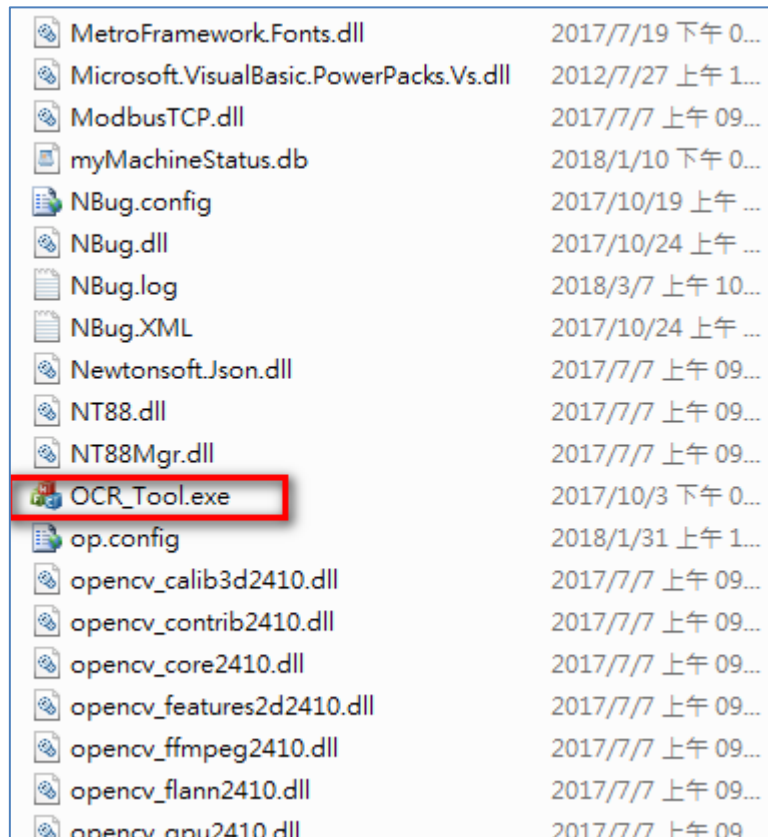
- 4) Click the “Send OCR” to get testing result in “OCR test” block
- 5) Click “Add OCR” to add script in the instruction



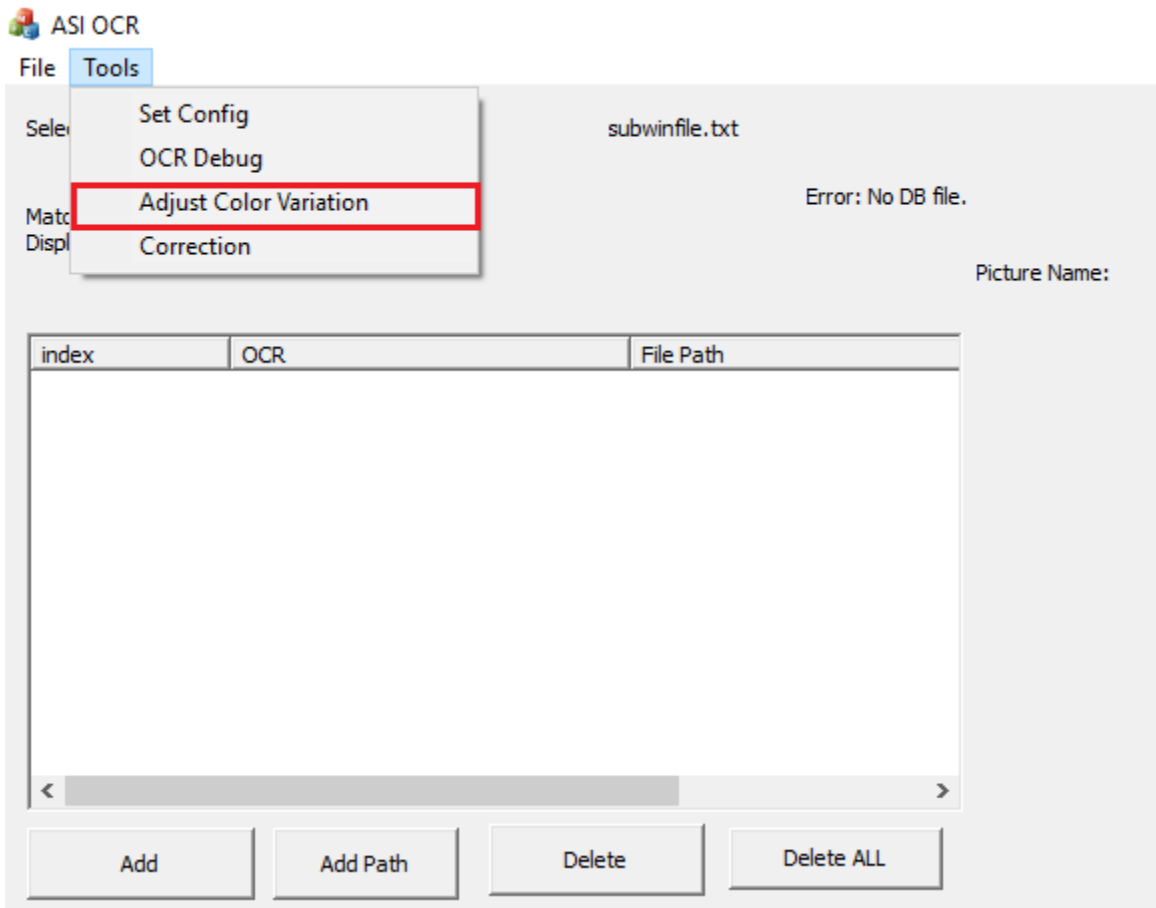
OCR Tool

Test the OCR –

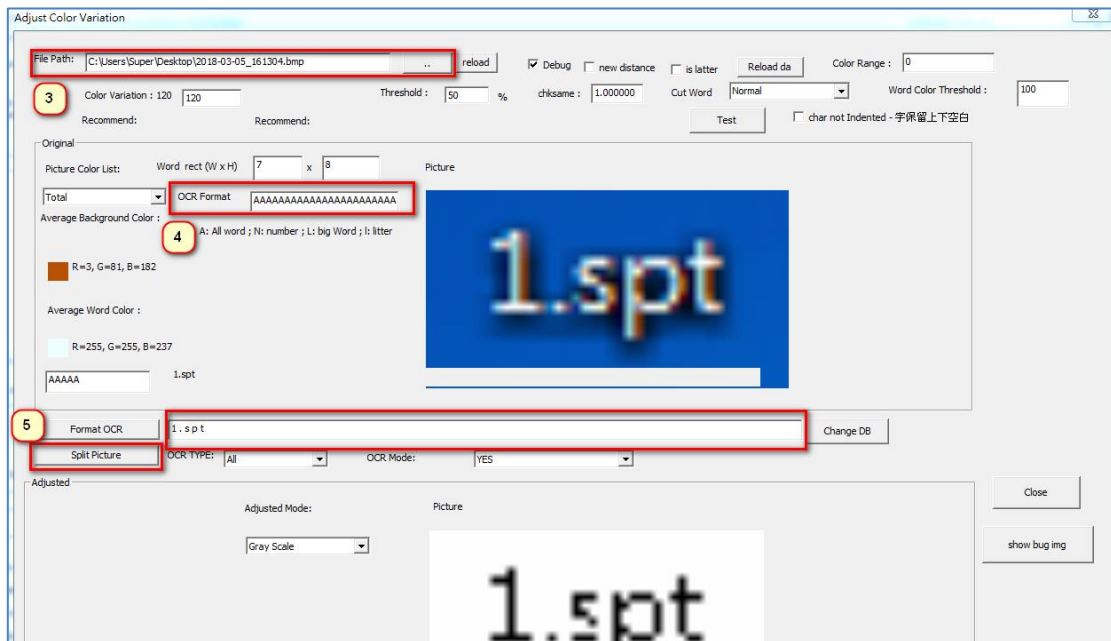
- 1) Open the “OCR_Tools.exe” on “C:\Program Files\ADLINK\DEX-100\main”



- 2) Click “Adjust Color Variation” on the “Tools” submenu

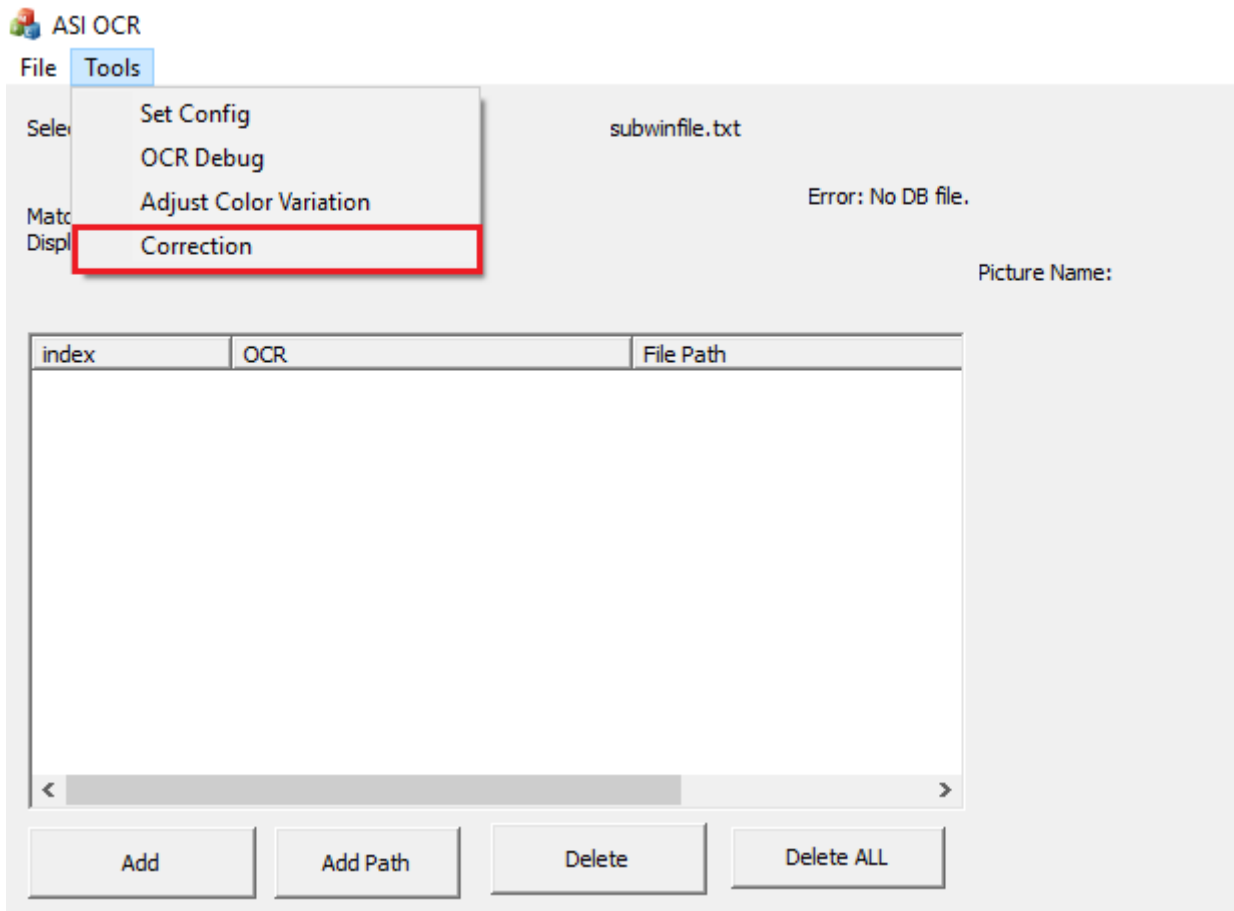


- 3) Open your ROI picture
- 4) Input the OCR format, for example, NAIII
- 5) Click the "Split Picture" ("Format OCR" is the same) and the result will show on text field



Train the OCR database with character format type –

- 1) Click "Correction" on the "Tools" submenu



- 2) Find the character you want to adjust, for example, "1"
- 3) Check the "Need to Change" to let this character editable
- 4) Input correct value
- 5) Check the "Is Letter", suggest check it because it will match to single character in the ligature
- 6) Choose OCR format type
 - a) 0: None (ALL)
 - b) 1: Number
 - c) 2: Uppercase Letter
 - d) 4: Lowercase Letter
- 7) Click the "change" button to save this correct from (4) and OCR type format from (6)

7.8. Full Control mode and Data Extraction mode switch

7.8.1. Mode Switch by DI

Data-Extraction Mode with running script can be interrupted by digital input (DIN2) signal. There are two modes for the current DEXPro running script status; they are “Start Auto Run Script Mode” and “Stop Auto Run Script Mode”. The first one is the script already auto running and the “Start(Auto)” button is pressed, and the other one is the script not running and the “Stop(Auto)” button is pressed.

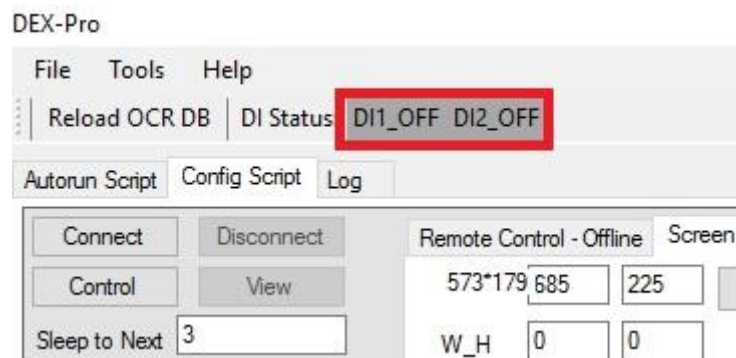
Start Auto Run Script Mode: When digital input (DIN2) is triggered and connected, Dex-100 will immediately stop running script and start running the background schedule script. And if the DIN2 is disconnected, it will stop running script. After operation of target machine, Dex-100 will automatically switch to Data-Extraction Mode again; restarting script if keyboard and mouse (HID) keeps idling over timeout.

Stop Auto Run Script Mode: When digital input (DIN2) is triggered and connected, Dex-100 will immediately start running the background schedule script. And if the DIN2 is disconnected, it will stop running script.

For the DIN1, it doesn't impact any behavior on the Start Auto Run Script Mode and Stop Auto Run Script Mode.

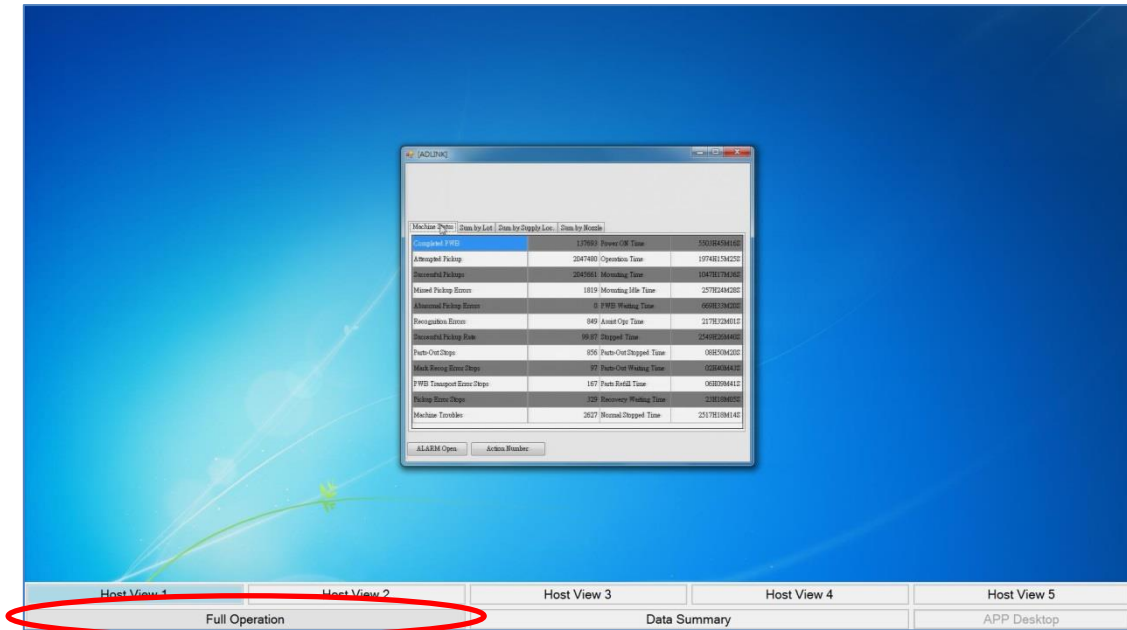
There are two DI labels to show the DI1 and DI2 status. When the DI1 detects the signal on 24v, it will turn on and the label will be changed from DI1_OFF(gray) to DI1_ON(green). However, the DI1 detects the signal on 0v, it will turn off and the label will be changed from DI1_ON(green) to DI1_OFF(gray). It is also the same as DI2 status.

P.S. Remember if the DIN2 is connected/disconnect quickly, it may be abnormal. Suggest the trigger is bigger than 1 sec. If your DIN1,2 Label status is abnormal, please re-trigger bigger than 1 sec again and it will recover original state.



7.8.2. Mode Switch by OP Screen Button

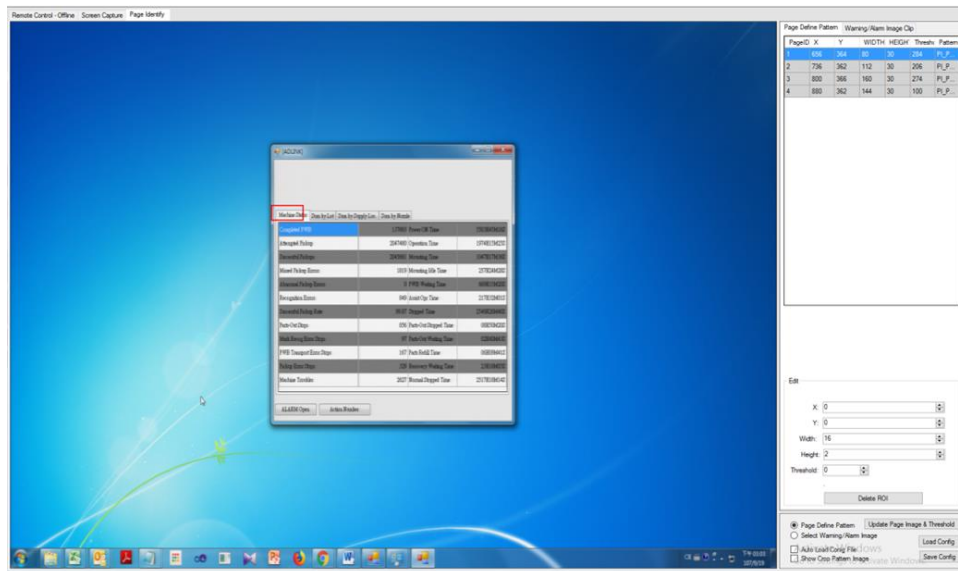
Without digital input (DIN2) button, there is another way to switch to Full-Control Mode during Data-Extraction. Click the button **Full Operation** in OP Screen, Dex-100 will stop running script and switch to Full-Control Mode.



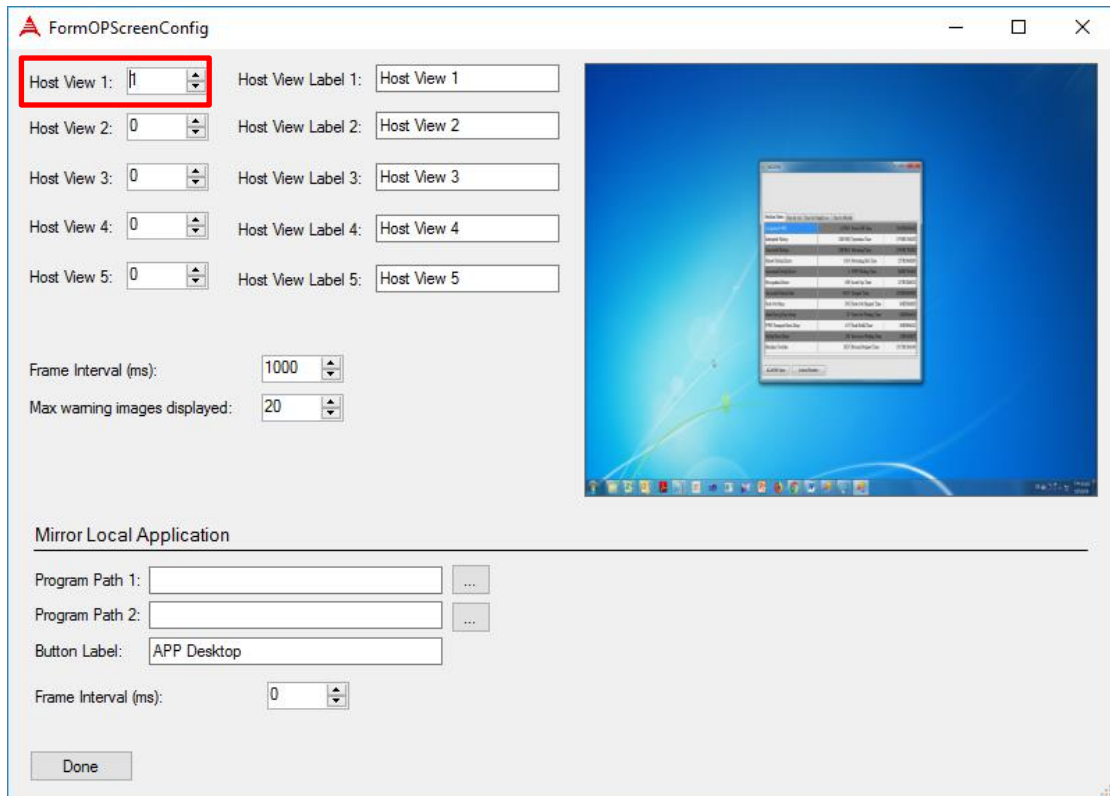
7.9. OP Screen Mode

Section 7.3 demonstrated the use of page identify function. Continuous with example 7.3, this example will show the steps to display host pages on OP-Screen.

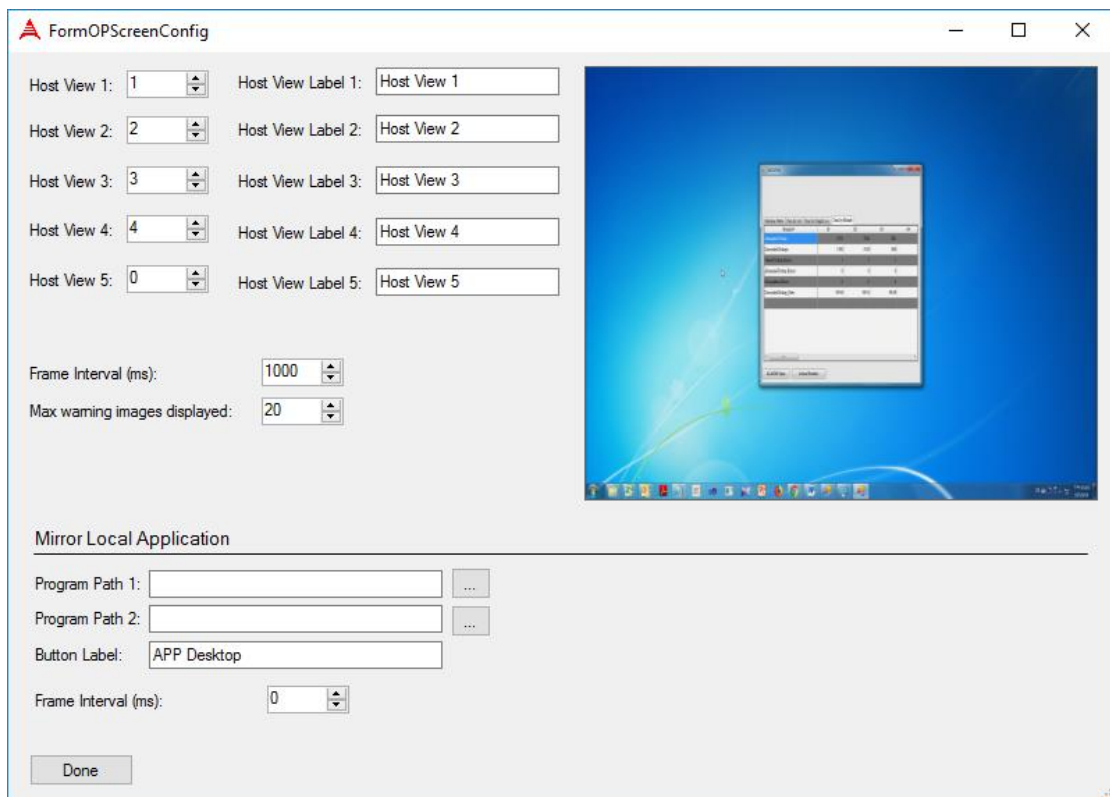
- 1) Set the path and load page identify configuration as 7.3.



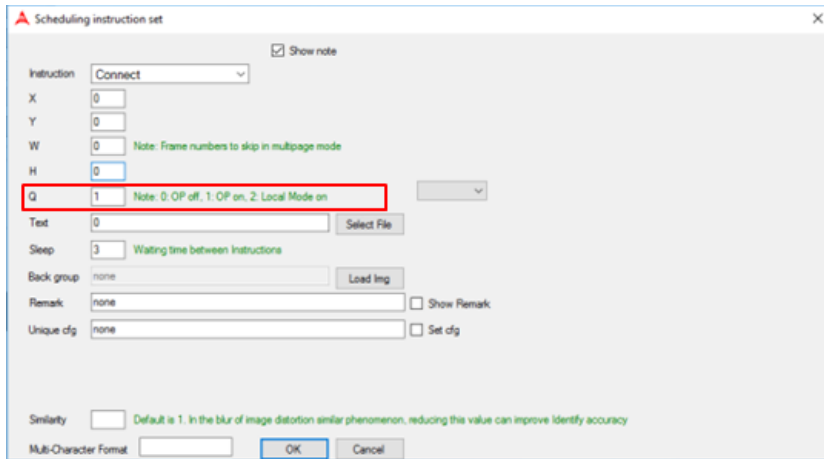
- 2) Open OP Screen Setting (Tools->Config->OP Screen Setting) and set Host view 1 to id 1. The panel on the right hand side will show the corresponding image layer 1.



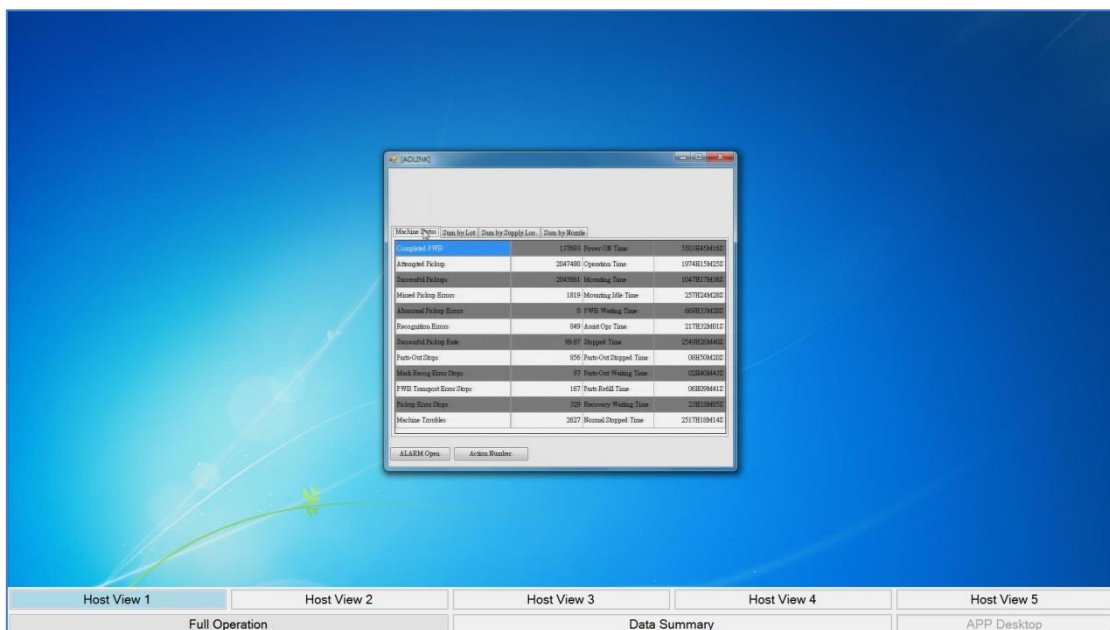
3) Repeat step 2, setting Host View 2 to page id 2, Host View 3 to page id 3 and Host View 4 to page id 4. Press button *Done* after setting.



4) Load script file for example 7.3 and set Q to 1 in connect instruction to enable OP-Screen.



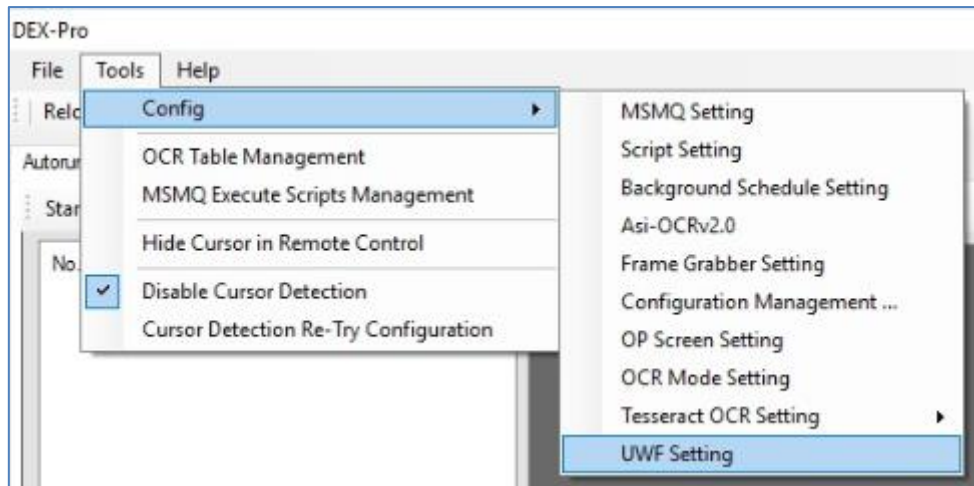
5) Run script and remote host screen will be displayed on OP Screen.



7.10. UWF

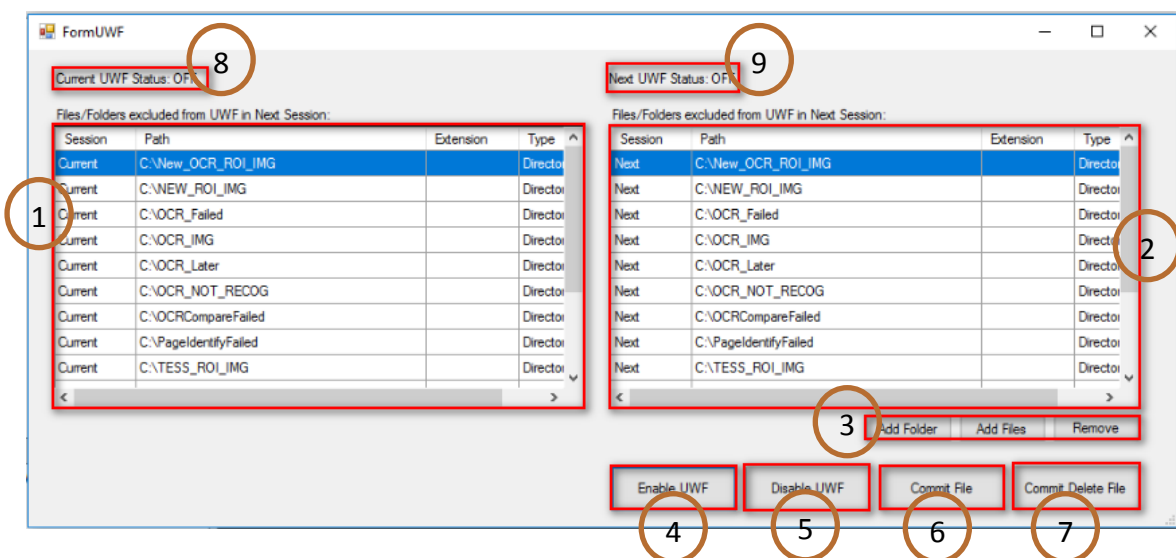
Unified Write Filter (UWF) is an optional Windows 10 feature that helps to protect your drives by intercepting and redirecting any writes to the drive (app installations, settings changes, saved data) to a virtual overlay. The virtual overlay is a temporary location that is usually cleared during a reboot or when a guest user logs off.

Dex-100 provides the UI to set the UWF, the entry point is on the main menu, [Tools→Config→UWF Setting] as follow picture.



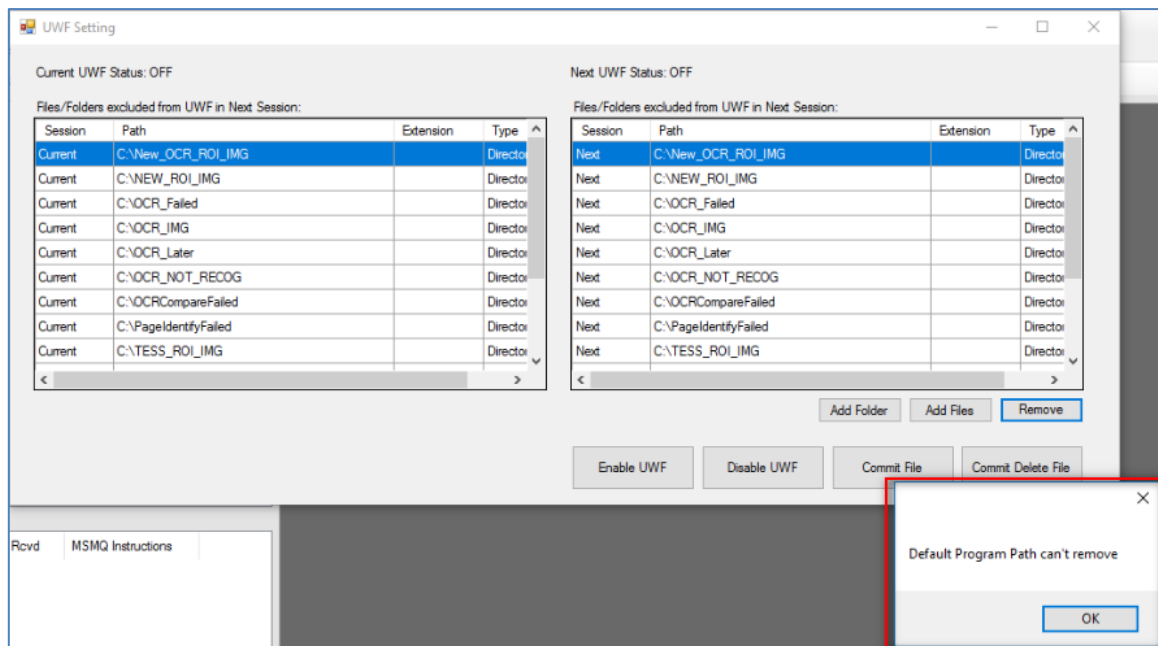
The UWF setting dialog will show.

- i. The left side data grid shows the current session setting folders or files
- ii. The right side data grid shows the next session setting folders or files
- iii. Add Folder: Add a folder to next session
Add Files: Add a file to next session
Remove: Remove the folder or file on the next session (right side data grid)
- iv. Enable UWF: Enable the UWF status "ON" (It will be open after restarting the Windows)
- v. Disable UWF: Enable the UWF status "OFF" (It will be open after restarting the Windows)
- vi. Commit File: It allows the file to add when the UWF status is "ON"
- vii. Commit Delete File: It allows the file to delete when the UWF status is "ON"
- viii. ON/OFF Status for current UWF session
- ix. ON/OFF Status for next UWF session



The default protection folder can't be removed, so if you want to remove, it will pop up the

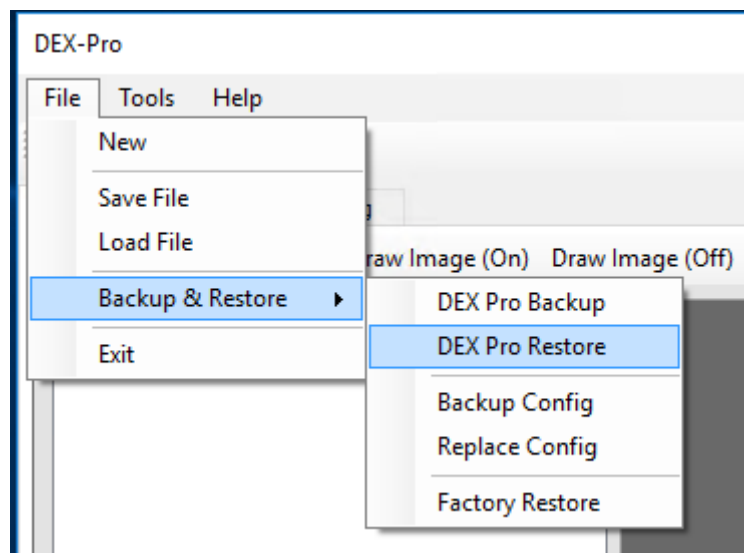
alert.



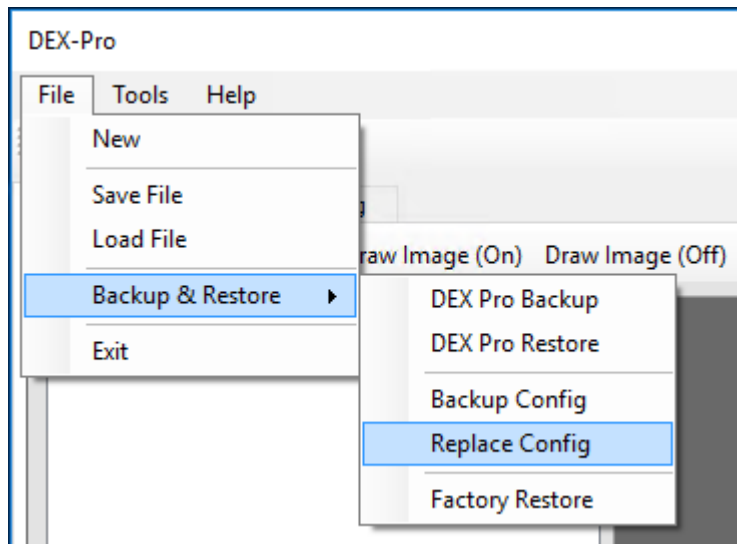
Remember when the UWF status turn on, the UWF window will become slowly to be opened because of it must read the current status by windows system response. Besides if re-install the SDK, remember to turn off the UWF first.

7.11. Reload the backup

To reload the backup files, click DEX-Pro Restore to ini files, OCR data and schedule files.



To reload xml configurations and one machine initial file on your system,



See [backup section](#) for more details.

7.12. Common Directories and Files

The following is the list of directories and files for Dex-Pro to save OCR images and scripts logs during data extraction:

- BLF : BMP Layer File for editing script
- SPT : Script File For Runtime
- C:_ : Contains OCR setting and OCRFile For OCR Training
- C:\OCR_IMG : If a new word is found and added to OCR DB when perform OCR instruction, the ROI image containing new word will be saved in this folder.. (only OCRMode = 0 support)
- C:\OCR_Later : Contains OCR letters as binary images. (only OCRMode = 0 support)
- C:\OCR_NOT_RECOG: If OCR engine recognizes no word in a ROI image, the ROI image will be stored in this directory. (only OCRMode = 0 support)
- C:\OCR_Failed: If OCR engine recognizes no word in a ROI image, the full screen-shot of host machine will be store in this directory. (only OCRMode = 0 support)
- C:\Documents\RVM_OCR_IMG :
If an OCR instruction's Q equals 1, then a full screen-shot of host machine will be saved in this folder when the OCR instruction is performed.
- C:\TESS_ROI_IMG : (only OCRMode = 1 support)
If the OCR result confidence level is lower than user defined confidence level score, it will store the ROI images.
- C:\Documents\RCM_TABLE_LOG :
The path for instruction "MSG_SAVE_TABLE_TO_LOG" to save table items and OCR results in CSV file.
- C:\Documents\RVM_OCR_CUR_ERR_IMG : Misjudgment pictures for cursor Detection
If cursor detection failed, a full screen-shot of host machine will be saved in this folder.
- C:\Documents\RVM_LOG :

Log files for script instructions

- C:\Program Files\ADLINK\Dex-100\main\Dex-100\logs:
Detailed log files for Dex-100 status and script instructions.

Note. The save image files will be deleted automatically when maximum number is reached or the file is expired.