MICROLINKS TECHNOLOGY CO., LTD.

Users Manual

VT300 Application Program Operates Manual

MLTC

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1. Application Program Interface Introduction

When the user use VT300 application program, an illustration window will show on the PC, see [Fig.1-1]. There are three groups of tool bars and 2 sub-windows in the shown window. Main Toolbar, Main function buttons, File List/Folders and sub-windows(left and right). On the left sub-window, it will show when VT300 is connecting with PC via USB cable at the moment. If it's disconnected, the button will be a white result and unclickable, see Fig.1-2.

If the PC OS is Windows 2000 and can not open the VT300 AP(wmvcore.dll cannot be found), please update your Windows Media Player to Version 9.0 or above.

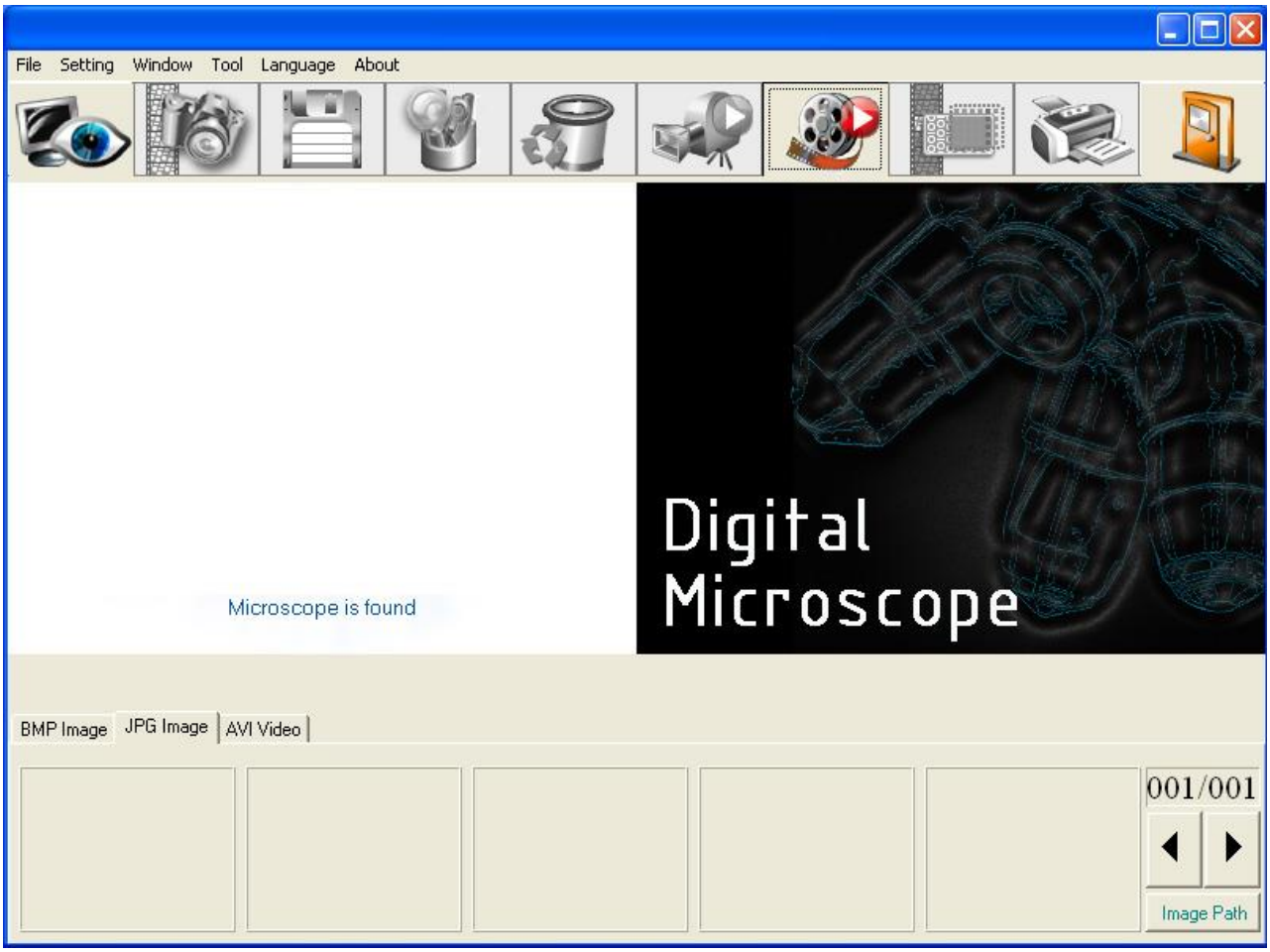

Fig. 1-1 main window

Fig. 1-2 connect button white

In the following, those main functions will be divided into four groups, one of the main function

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will only show applicable while connecting VT300 with PC. See Fig 1-6.

The four groups are as following.

1.1 Main Toolbars

See Fig.1-3 the toolbars of the application program which commonly uses, includes File, Setting, Window, Tool, Language and About altogether.

Fig. 1-3 Main Toolbars

1.2 Main Function Buttons

Fig.1-4 is a main function buttons which are commonly used or is for basic function, which includes connecting, taking photos, saving photos, editing…etc, there are 10 function buttons.

Fig. 1-4 main button group

1.3 The File List/Folder

Fig.1-5 is the tabulate of the saved images in the application program. The main list will list the files in the existing folder, which includes BMP folder, JPG folder and AVI folder.

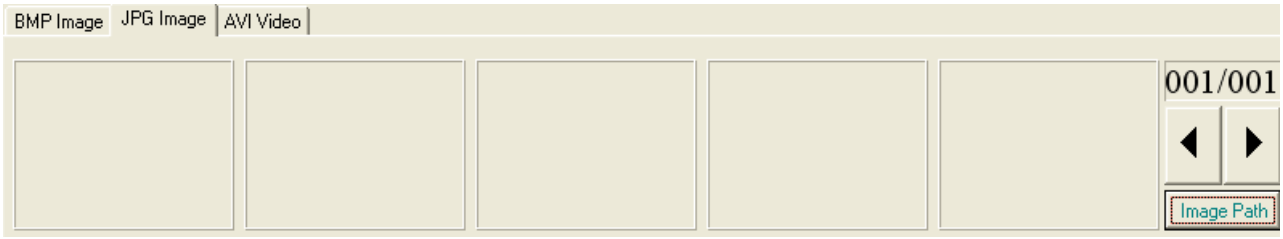

Fig. 1-5 File List

1.4 Mode Functions

After open VT300 program, please click connect button shown in Fig.1, when it is connecting, four mode functions toolbar will show under the left side of sub-window, the mode toolbar .

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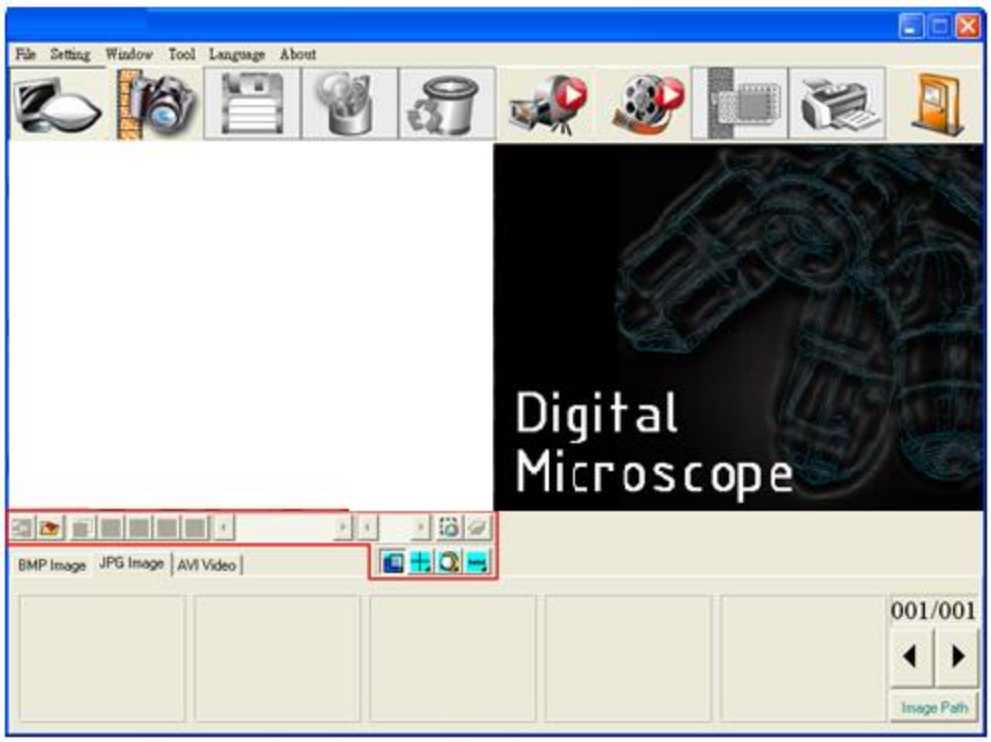

Fig 1-6 AP connecting

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2. Main Toolbars

The toolbars arranges the group and pursues to show, which include file, setting, window, tool, Language and select greatly about 5 of the choices altogether.

1.5 File

In the beginning, “File” is used for users who want to open/save file from other path or Print setting...etc see Fig.2-1.

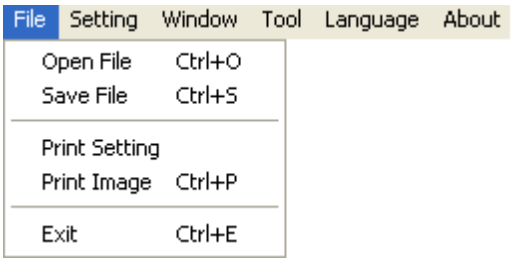

Fig.2-1 Choose File

2.1.1 Open File

There are three types of file formats in the Open File, Bmp, Jpg and Avi as optional. The default route for the open file folder is according to the current preserving file format. About tabulates of the file folders, please refer to Section 3.1 for more detailed information. In short, please refer to below Fig 2-2, if the preserving photo is in Bmp tabulate, the open file route is for preserving Bmp photos. If the preserving photo is in Jpg tabulate, the open file route is for preserving Jpg photos. If the preserving video is in Avi tabulate, the open file route is for preserving Avi videos. Ctrl +O are a fast key.

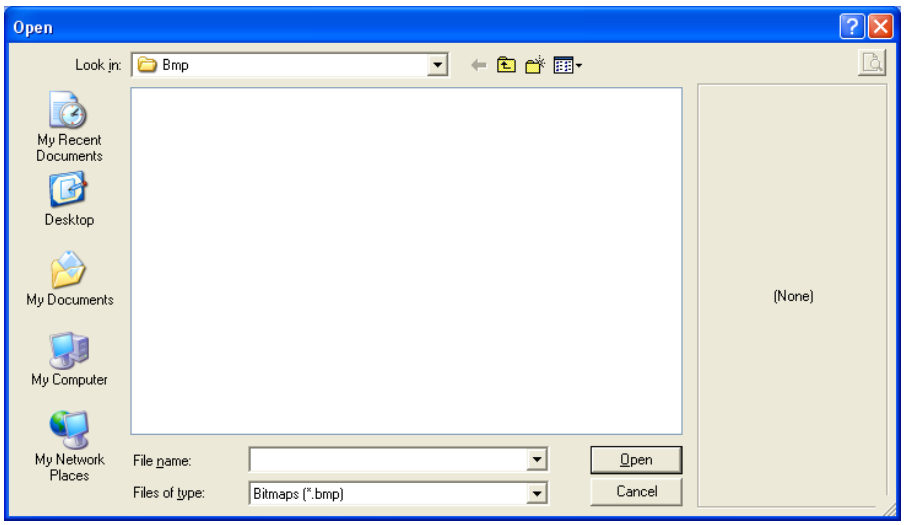

Fig.2-2 Opening bmp file

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2.1.2 Save File

There are only two file types for saving, Bmp and Jpg; the saved file is the image taken in the left sub-window, see Fig1-1. The storing file name is named by the program automatically; the user can change the name by themselves. File name is annual in year (yyyy), month(mm), day(dd), hour(hh), minute(nn), second(ss) setting, which Bmp_20080829180445.bmp as 2008(yyyy) 08(mm) 29(dd) 18(hh) 04(nn) 45(ss), which this way is the name of file won't be repeated and can also be realized the date and time by stored file name.

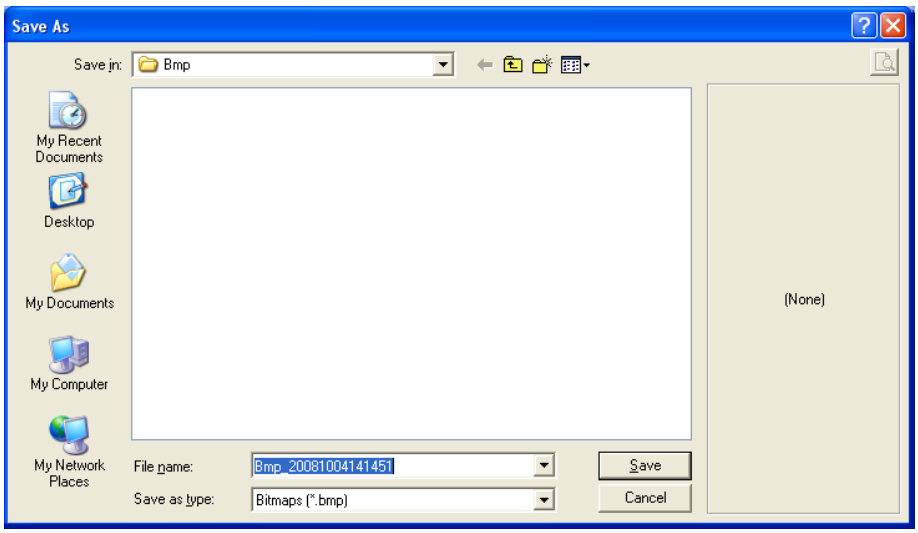

Fig.2-3 save file

2.1.3 Printer Setup

Set up printer can adjust paper between size, source or printer type.

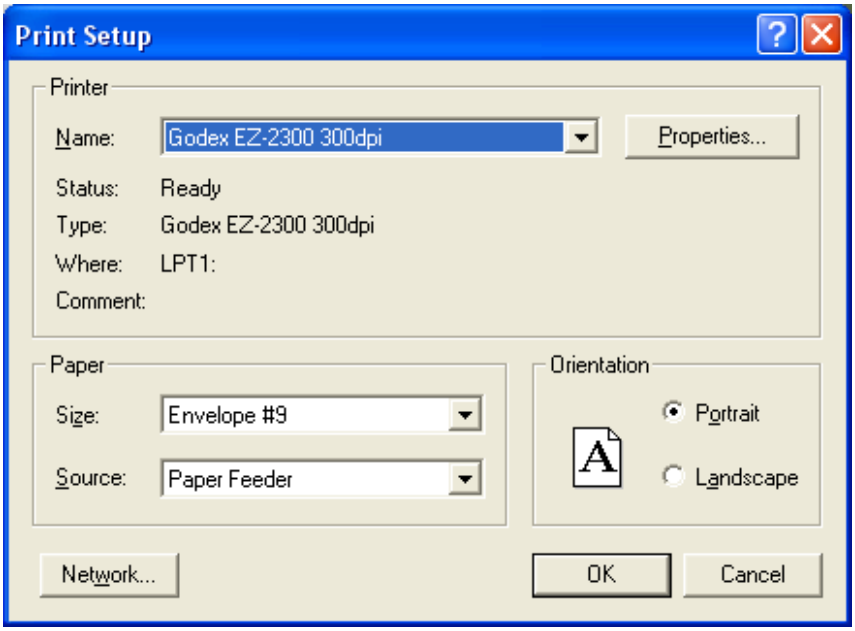

Fig.2-4 setup printer

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2.1.4 Print Picture

Ctrl+P are a fast key

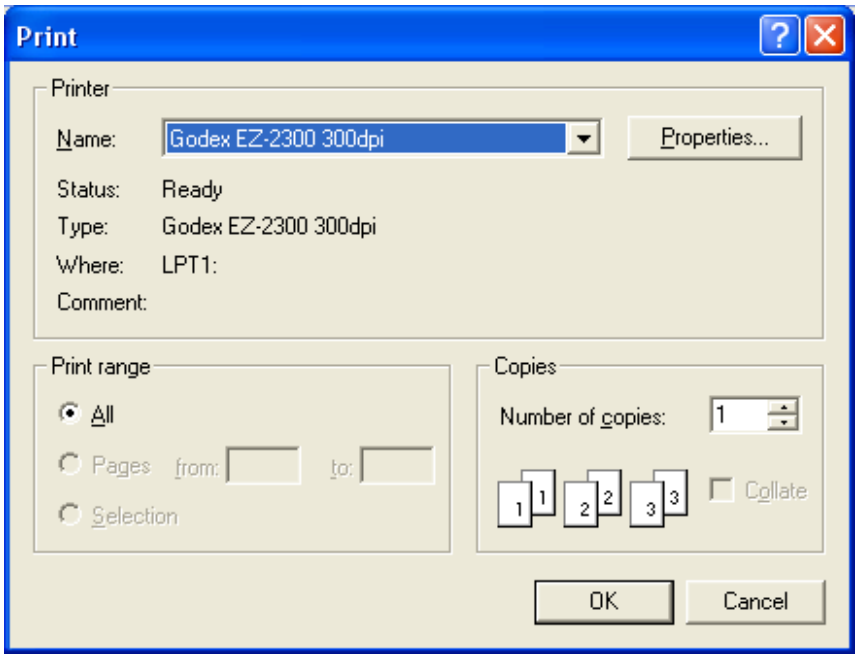

Fig.2-5 print

2.1.5 Exit

Once to choose to exit, the program would close. Ctrl+E are a fast key.

1.6 Setting

The Setting function is mainly to set up Video Format and JPG compression quality as Fig. 2-6 shows. If VT300 device is offline, video format and video signal source unable to set up (setting in white bar). On the contrary, it can set up while device is online.

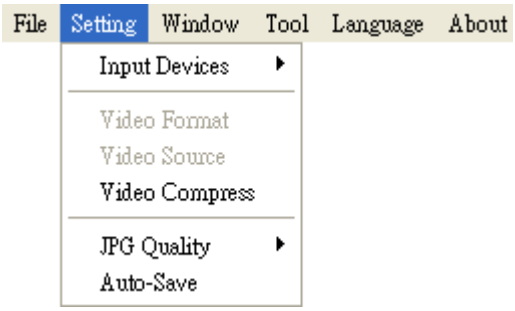

Fig. 2-6 Select Setting

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2.2.1 Input Devices Setting

Optional Input Devices, see Fig 2-7, when there are 2 or more Input Devices connecting to PC at the same time, you can choose which device you wish to use.

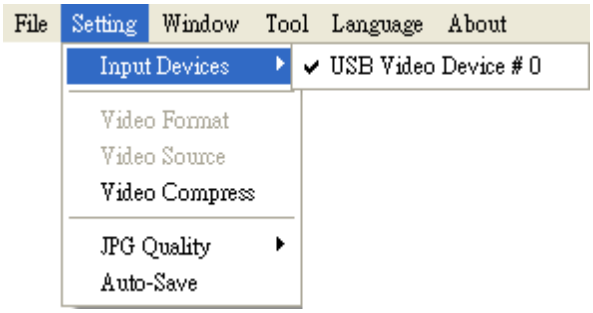

Figure2-7 Optional Input Devices

2.2.2 Video Format

Video Format is mainly to set up the frame rate, color space and output size etc. Fig 2-8 is the Video Format of built in UVC Driver contents. Frame rate is frame numbers per second (fps) for playing. Adjust the output size will slower or faster the fps, for example, if the fps is higher, the preview video will be less clearly but with smooth performance and. On the contrary, if the fps is lower, the image will be clearer but with a little lagging performance. This is due to the more frames requires the more CPU loading then cause the lagging performance. The output size defines the quality of the video, the default setting is 640*480.There are several options available for different purpose, such as, 320*240, 640*480.

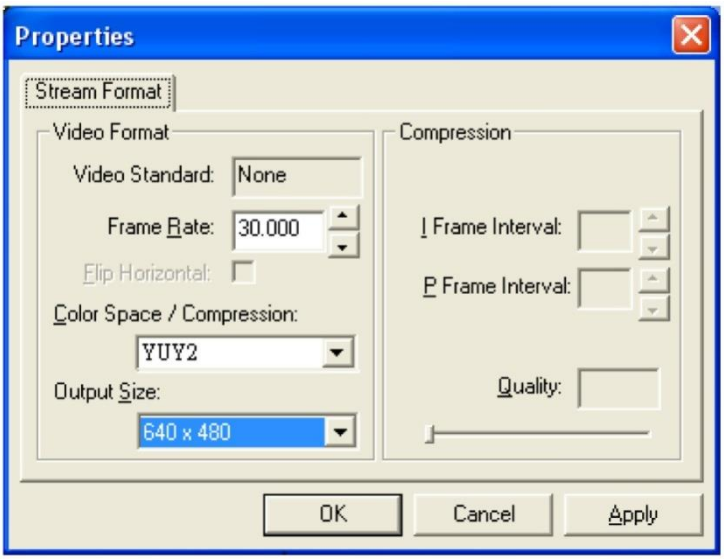

Fig. 2-8Video Format of microscope application program

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2.2.3 Video Format Source

Fig. 2-9aand Fig. 2-9b show the content of video format source, which is the default setting in Windows. In Fig. 2-9a the brightness, contrast, sharpness… etc. in the Video Pro Amp page are adjustable based on user's need.

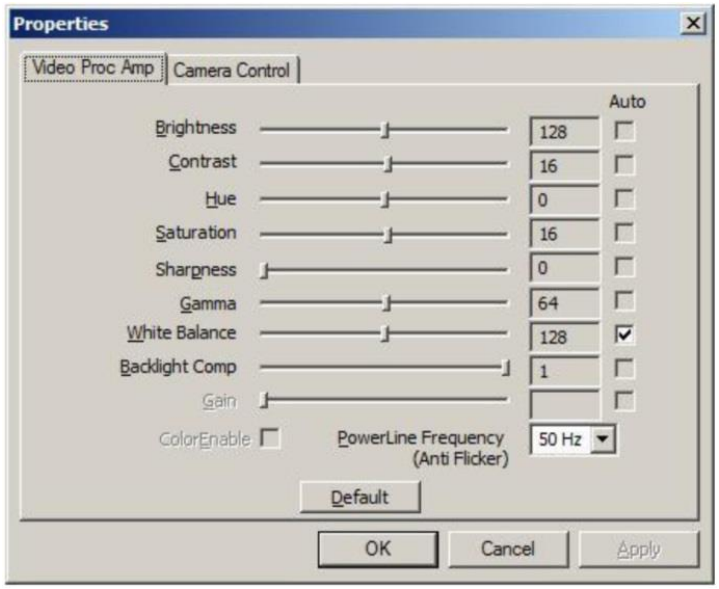

Fig.2-9a

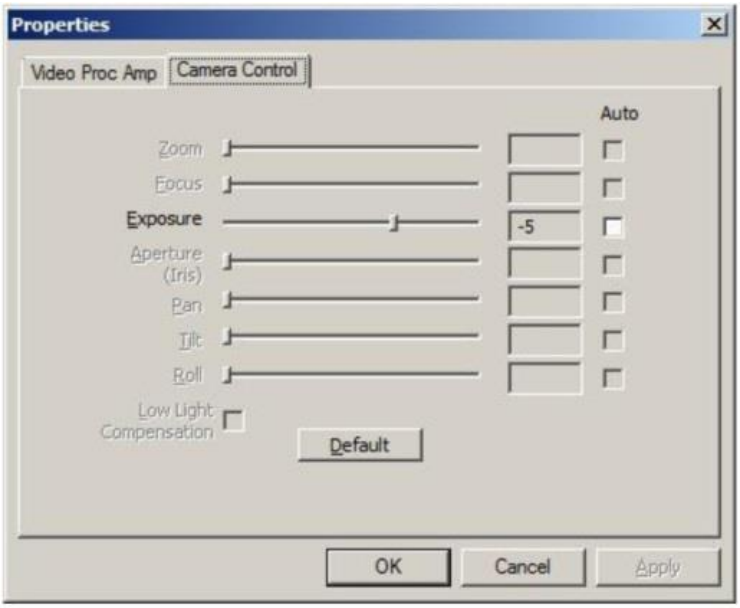

Fig. 2-9b

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2.2.4 Video Compressor

Normally, the video size is huge before compressor. We can use Compressor function to reduce the file size. Fig. 2-10 shows the optional compressor. There are optional Compressors which are built-in or can be installed by DIVX or other tool. Once the installation is completed, you can see them at the optional Compressors.

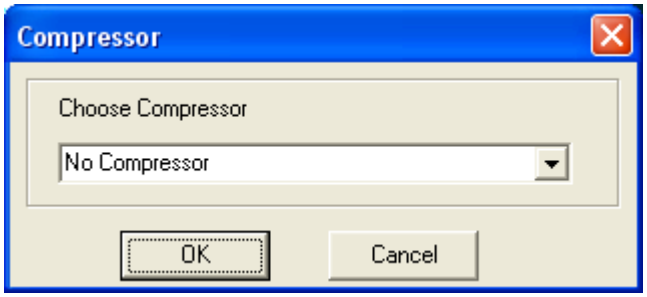

Fig. 2-10 Optional Compressors

2.2.5 JPG Quality

User can choose different JPG quality. The JPG compressor could distorted the saved image in order to meet the saving size, in this situation, when the saved quality is low, the image quality could be low and the file size is low too. See Fig 2-11.

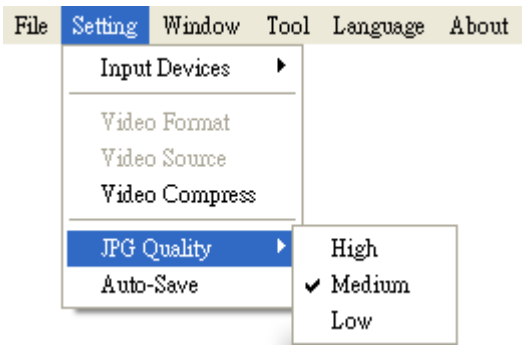

Fig. 2-11 Setting JPG qualities

2.2.6 Auto-Save

From "Setting->Auto-Save" shown Fig. 2-12, after checked auto-save, when clicking the save buttons it will not show the save dialog. The system will generate a file name and auto-save the file.

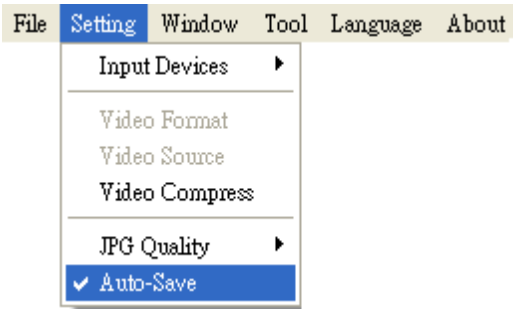

Fig. 2-12 auto-save option

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1.7 Window

The Windows can be chosen per USER's preferred window size, Fig. 2-13 shows the drop down menu of window size options. But it depends on User's PC to choose a suitable resolution as Fig. 2-18. For example, your PC is 1280*960 pixels; you can choose 1280*960. When the PC screen size is wide screen (16:9), it may cause imbalance ratio at "Full Screen" mode. The user may choose "Full Screen (4:3)" for an equally true ratio. When in "Video Resolution" mode, the window size is same as the output size. Please refer to 1.2.2.

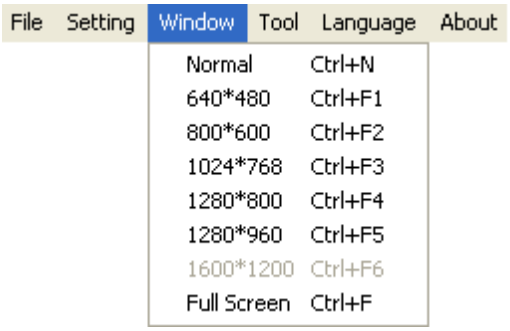

Fig. 2-13 optional window size

User can choose full screen under window mode as shown in Fig. 2-14. The original left sub-window in the AP will become a single window, available tool bar of the connection (disconnection), snapshot, video recording and video playing under the full screen.

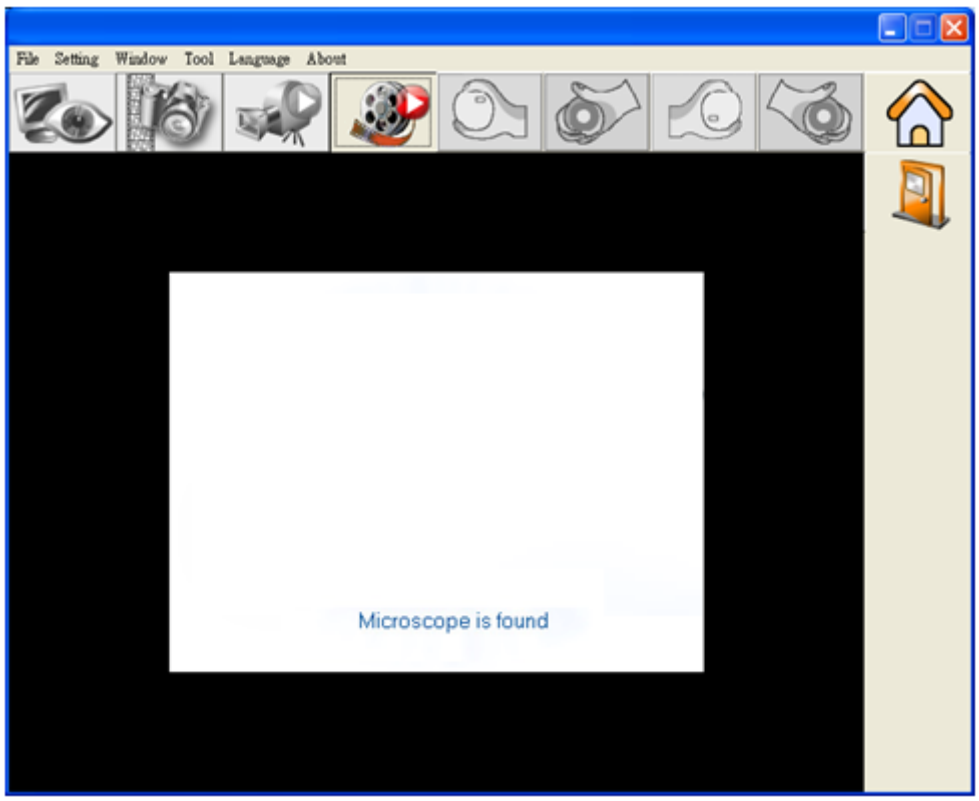

Fig. 2-14 Full screen of 640*480 under Window mode

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If changing to single window and want to return to normal mode, please click “Normal Mode button” see Fig. 2-15

Fig.2-15 Normal Mode

Single window also has video control mode shown Fig. 2-16. To preview other functions of “video control mode” please refer to section 5.

Fig.2-16 4 Video Control

Click snapshot button and will pop up a window see Fig. 2-17, it provides function of Open file, Save file, Delete image, Image process and Print image.

Fig. 2-17 ImageView of window

1.8 Tool

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Use the Tool to open file and set up Path, as shown in Fig. 2-18.

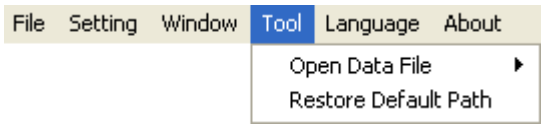

Fig. 2-18 Tool

2.4.1Restore default path

The function allows User to preserve the initial setting route, easily find and Save the video and photos at the preserved route

2.4.2Open Data file

Open files at BMP , JPG & AVI folder.

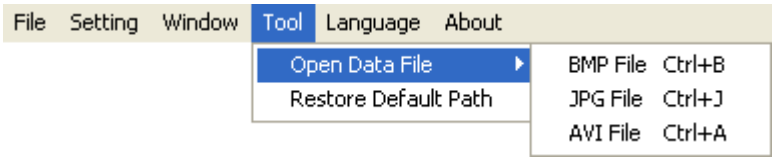

Fig.2-19 Open file folder

1.9 Language

The VT300 AP includes; English、Traditional Chinese、Simplified Chinese、. The initial language will automatically follow up User's OS system. It can choose the other language as shown in Fig. 2-20.

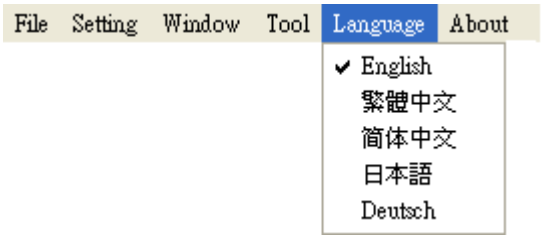

Fig.2-20 Select language

1.10 About

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Show the VT300 relevant information.

Fig.2-21 select about

Learn the application program version.

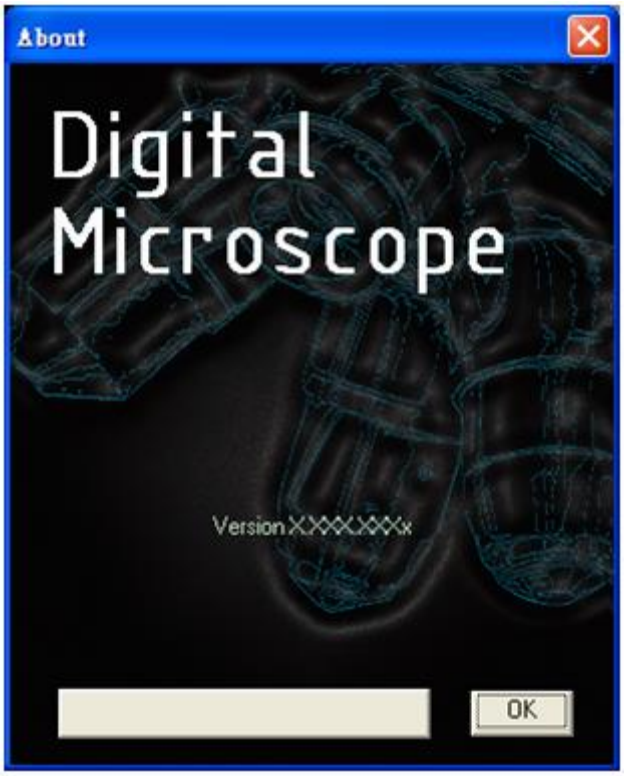

Fig.2-22 About VT300

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3. Main Function Buttons

Main function button group see Fig 1-4 which are commonly used or basic function, which includes connecting, taking pictures, saving, editing…etc. there are 10 functions button.

3.1 Connect/Disconnect

3.1.1Connect

The connect icon as Fig. 3-1, the user will connect the line while clicking the connect button, namely connect with VT300 device to PC. If it cannot connect, please reinsert VT300 device to the other USB port.

Fig.3-1 Connect button icon

3.1.2Disconnect

The button icon which shows disconnect is like Fig. 3-2, by clicking this button to disconnect. When the user starts to play the video, VT300 will be disconnected automatically. When re-connecting the VT300 with the AP, the video format will go back to the default value.

Fig 3-2 disconnect button icon

3.2 Snapshot

Snapshot icon is as Fig. 3-1, the function allows taking photos in Preview、Video & Play, and image size depends on Video Format source, i.e. Height & Width.

Fig 3-3 snapshot button icon

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3.3 Save Image

Save image icon is as Fig. 3-4, the saved file name is automatically created. The detail of the file name is as description 1.1.2.

Fig 3-4 save image button icon

3.4 Edit the Picture / Diverge From Editor's Picture

3.4.1Edit picture

The editor is as Fig. 3-5 including several convenient functions. When clicking editor icon as Fig 3-5, the toolbar for editing image will show up as Fig 3-6.

Fig. 3-5 editor icon

Fig. 3-6 editor tool

The editing toolbars are upper roll and button roll.

Please click the original fit( ) first then start to use the button roll tools. The edit text, pen( ), line( ), rectangle( ), ellipse( ) fucntions are only available until the original fit has been selected.

Fig. 3-7 Click ( ) to start editor tool

When click the edit text ( ) butoon, see Fig 3-8, the edit text group includes Edit

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text color( ), edit background color ( ), edit background color transparent ( ).

Fig. 3-8 Click ( ) to start text tool

When click select ( ) butoon and use mouse to draw the range, the select group tools are available as Fig 3-9. The select tools includes cut ( ), copy ( ), paste ( ), save select ( ).

Fig.3-9 Click Select ( ) to start other functions

"Edit Image" toolbar includes many functions, below will explain each functions:

- Normal : When this button is clicked, all the buttons will return to normal.
- Move Image : When the "original fit" button begins using, select "Move Image" and click mouse of left button to move on the image.
- New File : "New file" can open a blank page of image, image size is 400*300 by the Fig 1-1 of the right sub-window size.
- Save Image : Save image Fig 1-1 on right sub-window. The image size as same as video format of output size.
- Rotate Left : rotate image to left 90 degree.
- Rotate Right : rotate image to right 90 degree.
- Fit The Window : This function can let image to fit the window size.

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When selecting this function, it cannot use “edit text”, “select”, and “drawing” functions.

- Zoom In ：Enlarg image without interpolation therefore if the scale larger than orginal size distortion will appare.
- Zoom Out ：To shirk image.
- Rndo ：To go back the movemenet and only can use up to 3 times
- Redo ：To go to next movemenet and only can use up to 3 times.
- Line Style ：Choose line style by clicking “Line style” button and it will pop up(Fig3-10) dialog box.

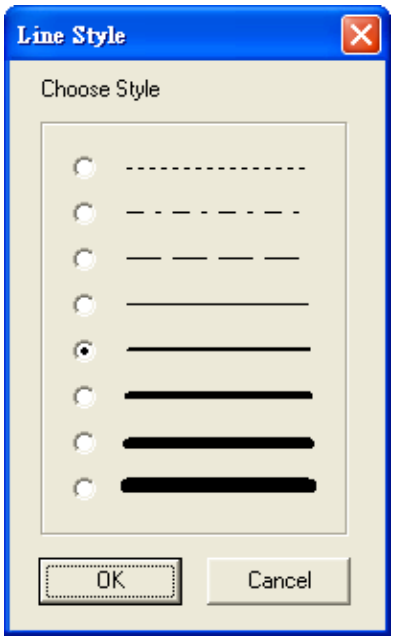

Fig. 3-10 Choose line styles

- Color ：To choose pen’s “color” click on the color button and it will pop up (Fig 3-11) dialog box.

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Fig. 3-11 Choose color

- Delete Image : The Fig1-1 image in right sub-window will be deleted.
- Exit Editor : To exit image editor,the “image editor” toolbar will be closed.
- Orignal Fit : When the image size is bigger than the window, using this function, it can do “Edit text”, “select”, and “drawing” functions. The window won’t see the whole image, but only some parts.
- Edit Text : Edit text is words that can be written on image.
- Edit Text Color : Text color can be changed by clicking “edit text color” button and it will pop up (Fig 3-11) dialog box.
- Edit Text Background Color : Text background color can be changed just by clicking “edit background color” and it will pop up (Fig 3-11) dialog box.
- Edit Text Background Transparent : Text background can be set as transparent with no background color.
- Text Size : Text size can be changed.
- Pen : Pen can draw anything and its function is like a regular pen and pencil.

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- Line ：Draw stright line.
- Rectangle ：Draw rectangle.
- Ellipse ：Draw ellipse.
- Select ：Selects the area on the image, after the selection, it can cut, copy, paste, and save the selection area function.
- Cut ：Cut frame on the Fig1-1 right side window of image.
- Copy ：Copy selected frame on the Fig1-1 right side window of image.
- Paste ：Paste whats been cut or copied image to display on the Fig1-1 right side window of image.
- Save Select ：Save selected frame on the Fig1-1 right side window of image.

3.4.2Leave Editor

Fig. 3-12 Editor icon

3.5 Delete Image

Fig. 3-13 delete image icon

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3.6 Video recording / Stop Making Video Recording

3.6.1Recording

Press video recording icon see Fig 3-14 and firslty name the file name, the file name is automatically created as Section 1.1.2. If you wish to change the file path, please refer to Section 3.2.3. If you need to compress the file size, please refer to Section 1.2.3.

Fig. 3-14 video recording icon

3.6.2Stop Recording

Fig 3-15 stop recording icon

3.7 Video playing / Stop playing video

3.7.1Video playing

The recorded video will play at left sub-window as Fig. 3-16. Once it palys, the microscope is automatically disconnected.

Fig. 3-16 film broadcasting icon

Fig. 3-17 Tool of playing

- Play : Press the button to play video.
- Pause : Press the button to pause playing video.
- Stop : Press the button to stop playing video.
- Repeat : Press the button to repeat playing video.

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- Exit：Press the button to exit playing video mode.
- No Flip “ ” ：image direction flipping, by means does not make any direction flipping shown in Fig 3-18.

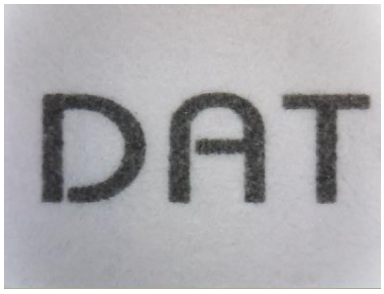

Fig 3-18 Video image with no flip

- Vertical Flip “ ” ：The video image upside down 180 degree, which is vertical flip, shown in Fig. 3-19.

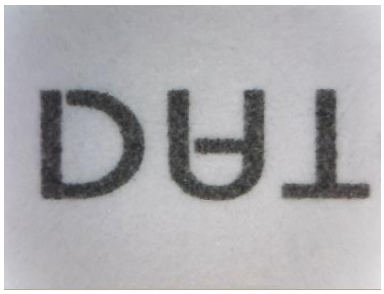

Fig. 3-19 Video image do vertical flip

- Horizontal Flip “ ” ：The video image left and right mirror 180 degree flip which is horizontal flip shown in Fig. 3-20。

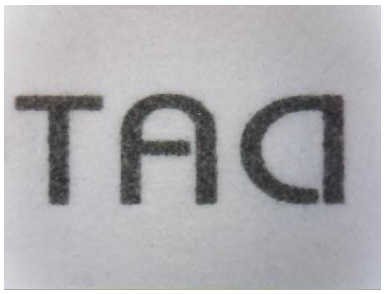

Fig 3-20 Video image do horizontal flip

- Vertical and horizontal Flip “ ” ：The video image will do horizontal and vertical flip shown in Fig. 3-21

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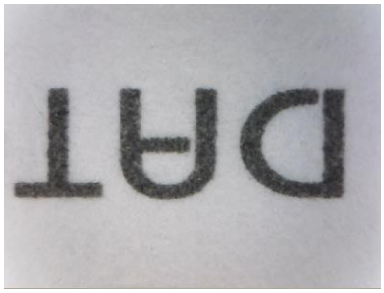

Fig. 3-21 video image becomes horizontal flip

Click right of mouse to show Fig. 3-22, all functions are the same as toolbar's.

Fig. 3-22

3.7.2 Stop playing

Once it stops play, the VT300 is still disconnected to PC.

Fig. 3-23 stops broadcasting

3.8 Edit Image / Leave Editing

3.8.1Image Processing Editor

Image processing editor as Fig 3-24, VT300 AP provides users few simple image processing editing functions.

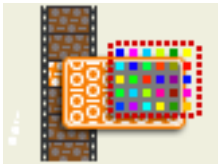

Fig. 3-24 Image Editor Icon

While clicking the Image editor icon, the image processing editing function buttons as Fig 3-25 will show up on the right sub-window [Fig 1-1].

Fig. 3-25 Image processing Editing toorbar

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Both can set the threshold value of black/white and inverse for the image, see Fig 3-26 to adjust the threshold value by the scroll. The image effect will be change as the adjustment value.

Fig. 3-26 Changing Threshold

- Original Image ：This button is to go back the original image. (before any image edition).
- Gray Level：：This button is to change full color to gray mode.
- Highlight Edge ：This button is to highlight the image edge.
- Highlight Pxiel：This button is to strengthen in the picture between the different pixels.
- Black/White：This button is to turn the full color image to black and white
- Inverse：This button is to inverse the image.
- Exit：This button is to exit video processing mode.

3.8.2Leave Image Processing Editor

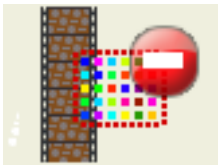

Fig. 3-27 Leave Image Editor

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3.9 Print Image

Fig 3-28printing image

3.10 Diverge from the application program

Fig. 3-29 diverges from the application program

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4 The File List/Folders

The file tabulates pages and signs as Fig. 1-5, file tabulates is to list all file folders, which includes JPG folder, Bmp folder, and Avi Folder.

4.1 The File Tabulates

Fig.4-1 tabulate for BMP , JPG & AVI files

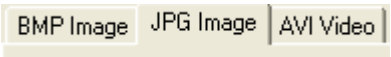

Fig. 4-1 file tabulates

4.2 The File Tabulates On Page Number

Fig. 4-2 the file tabulates on page number

4.2.1Show the number of pages

001/001= X/ Y, X is sequence and Y is total number of pages.

4.2.2Change page button

Showed as Fig 4-2, the left and right button is to change page number. Left button is to decrease page number and right button is to increase page number.

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4.2.3Image Path

Click the “Image Path” to change the image saving path, see Fig. 4-3. To choose the file saving path from the Data Path Director.

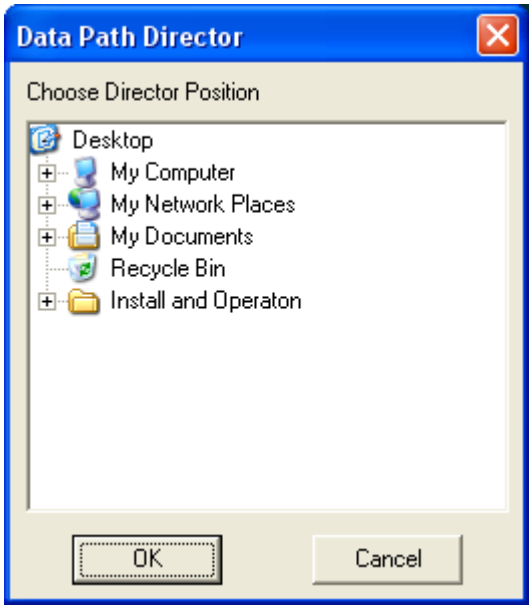

Fig. 4-3 Data Path Director

4.3 Quick Click

Click right of Mouse on the saved image and show Fig.4-4, it can directly Open or Delete file.

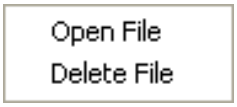

Fig. 4-4 Quick click

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5 Mode Functions

When connecting the AP with VT300, the four mode functions will show up on the button position under left sub-window. See Fig.5-1.

Fig 5-1 Modes Toolbar

- Comparison mode (refer to section 5.1) :
  Comparison mode can overlapping two frames. The frame can be whole or any size to compare. This mode can see two frams of simiarities.

- Aiming mode (refer to section 5.2) :
  Provides a cross, area, rectangle and circular different aiming mode to aim the observation object .That can help capture observation object.

- video control mode (refer to section 5.3) :
  The mode can control left hand or right hand to hold the machine, which can capture yourself or objects, but the directions might not be correct. It can use the mode to adjust the dirctions and it can adjust contrast, brightness and exposure.

- measurement mode (refer to section 5.4) :
  Measurement mode has ruler functions to measure at real time, which provides different measurement tools.

5.1 Comparison mode

When connected, the defult of the toolbar is set as to compare shown in Fig.5-2 and Fig 5-3. In Fig.1-6 right sub-window has no image so some part of the buttons wouldn't work in this mode. Comparesion mode can be overlap with another video image to compare and to cut half of the image for comparession.

Fig. 5-2 Comparison mode

Fig. 5-3 Comparison mode toolbar

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5.1.1 Load right side image “ ”

When capture one imge or open one image, the Comparison toolbar of “load right side image” button can be choosen. Shown in Fig.5-4. When clicking “load right side image” button see [Fig 5-4], image comparing functions is available see [Fig 5-5]. It can overlap image or cut half of the image and load into left sub-window for comparing. If want to leave comparison mode please click “load right side image” again to go back preview mode.

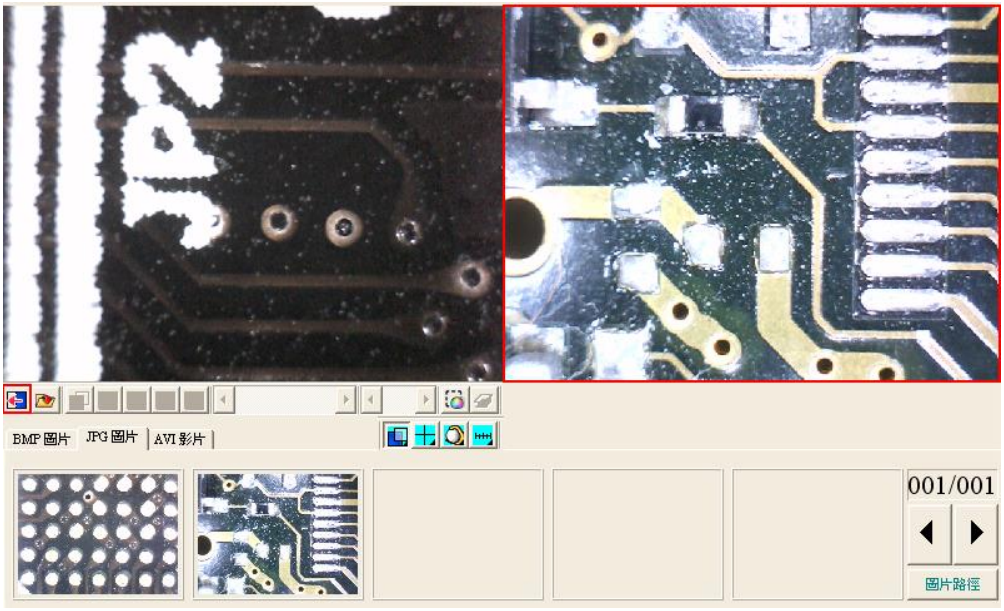

Fig.5-4 image on the right window

Fig.5-5 Loading image will be compared

5.1.2 Load image “ ”

When the right sub-window doesn’t have image (Fig.5-6), load & select image from file folder by clicking “load image” button.

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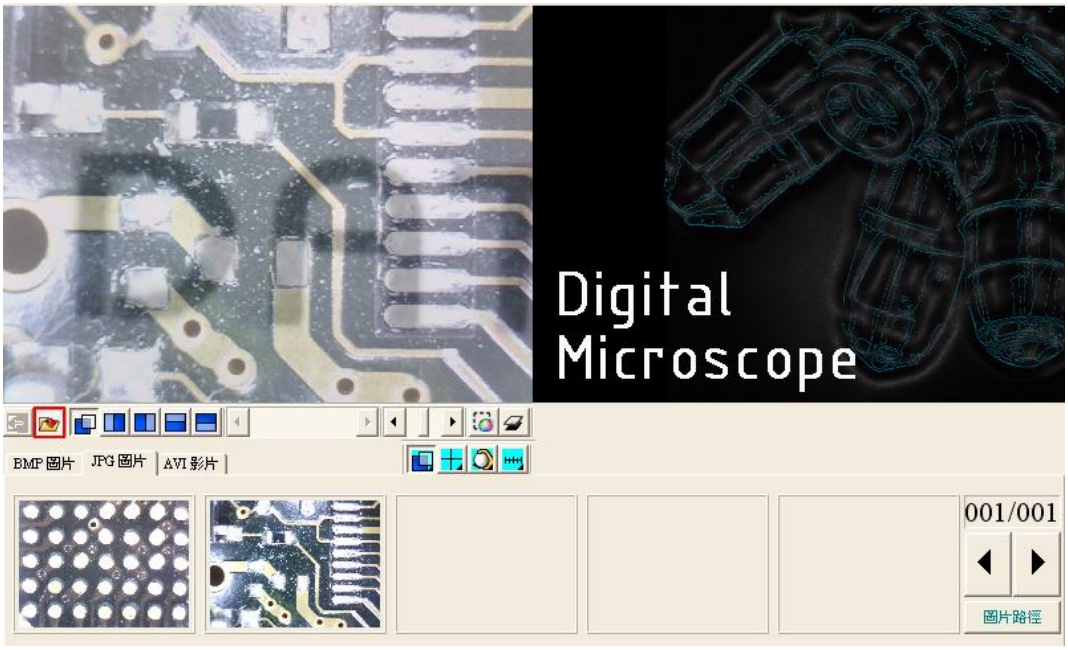

Fig.5-6 click the load image button

Click “Load image” button. After opening the file, it can use overlapping and cut half image function. shown Fig.5-7. If want to exit the program just click on “Load image” to go back to preview mode.

Fig. 5-7 After loading image

5.1.3 Overlap comparison “ ”

The “overlap comparison” can makes the image transparence. With overlap in the preview image, then at the same time shows two frames. See Fig.5-8.

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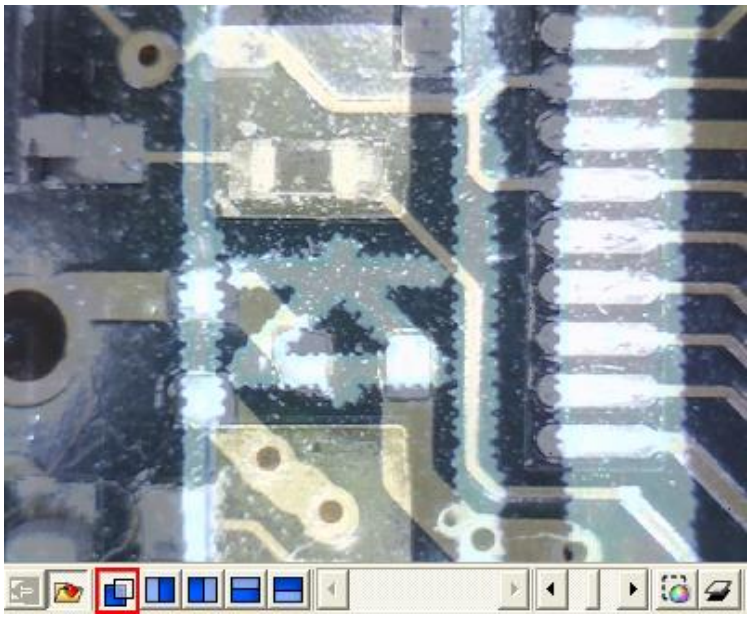

Fig.5-8 Overlap comparison

5.1.4 Left side comparison “ ”

When the left sub-window separates into left and right sides, the left side frame is preview image, and the right side is loaded image. See Fig.5-9.

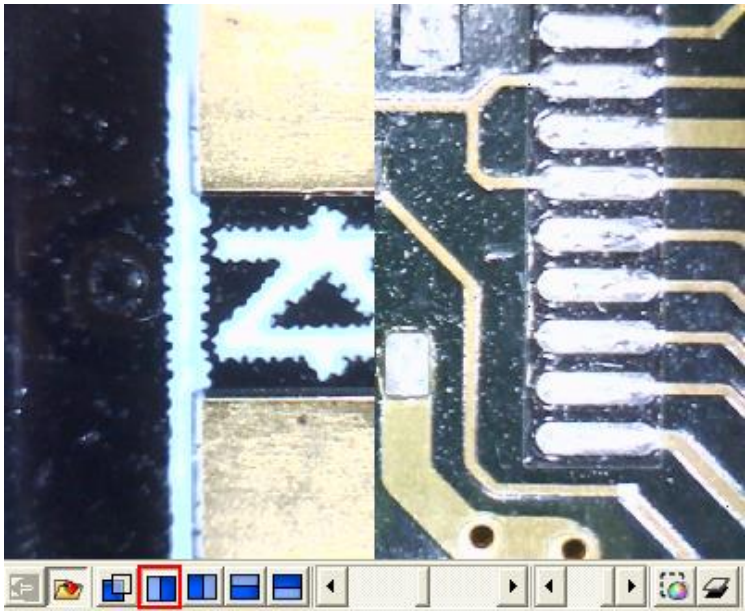

Fig.5-9 Left side comparison

5.1.5 Right side comparison “ ”

The left sub-window separates to left and right, the right side frame is the video image and left side frame is loaded image. See Fig.5-10.

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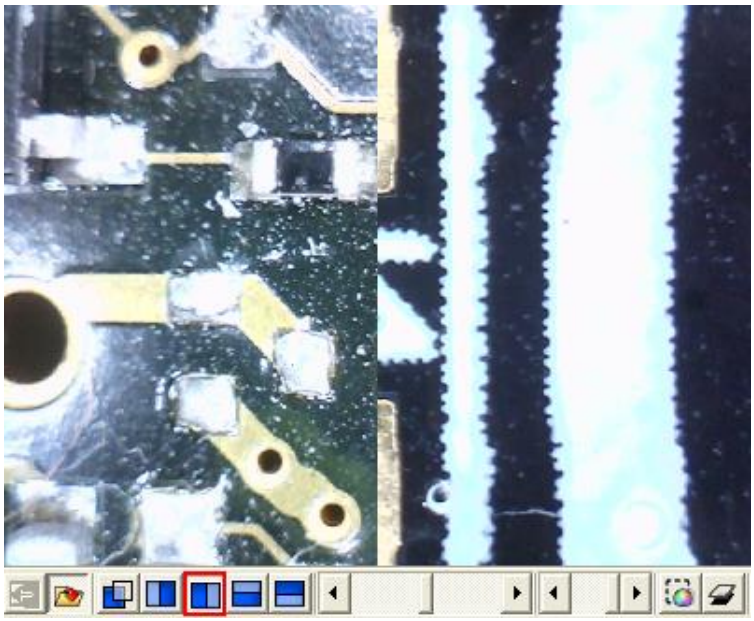

Fig.5-10 Right side comparison

5.1.6 Top side comparison “ ”

Left sub-window separates into two half which is top and bottom. Top is video image, and bottom is loaded image. See Fig.5-11.

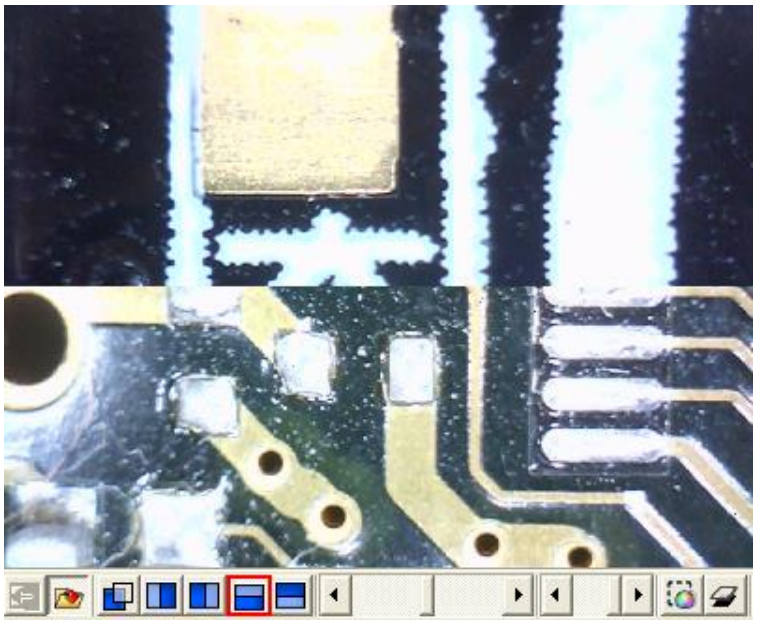

Fig.5-11 Top side comparison

5.1.7 Bottom side comparison “ ”

Left sub-window separates into two sides, bottom side is preview image, and top side is loaded image. See Fig.5-12.

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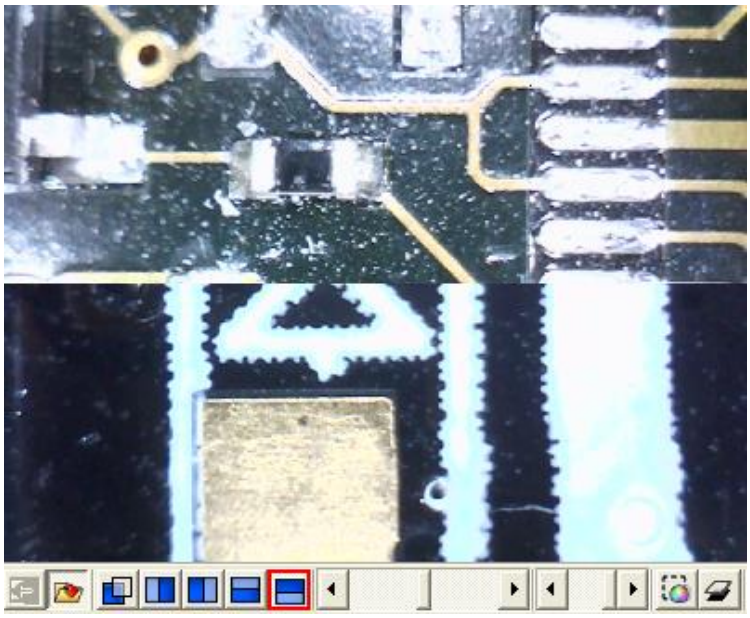

Fig.5-12 Bottom side comparison

5.1.8 Window ratio adjustment

When choose half compare, scroll to adjust the frame ratio. Show Fig.5-13.

Fig.5-13 Window ratio adjust by scrollbar

5.1.9 Transparent adjustment

Image can be adjusted from the scrollbar to change the pictures transparency. Show Fig.5-14.

Fig. 5-14 Transparency adjust by scrollbar

5.1.10 Knockout color " "

Choose to knockout background color and some color on image can be cut out.

5.1.11 Combined image " "

Before capture image click the button, which will combine video image and loaded image to combine. If not, the capture images will only video image.

5.2 Aiming mode

The aiming mode may draw different type like the cross, circular, rectangle, and area. It helps the user observation. It can draw the different aiming mode in the video image. Fig.5-15 is the selection to aiming mode, aiming toolbar shown in Fig.5-16. This mode may overlap the

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different aiming functions.

Fig. 5-15 Aiming mode

Fig. 5-16 Aiming mode of toolbar

5.2.1Draws cross “ ”

Click this button to draw the cross which may adjust the size by scrollbar. Show in Fig.5-17.

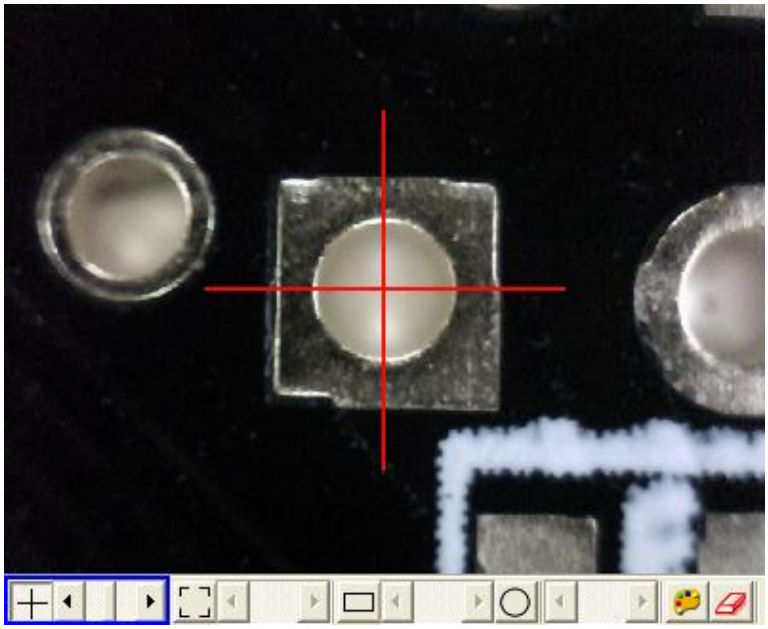

Fig.5-17 draws cross

5.2.2Draw area “ ”

Click the button to draw the area to adjust the size by scrollbar. Show in Fig.5-18.

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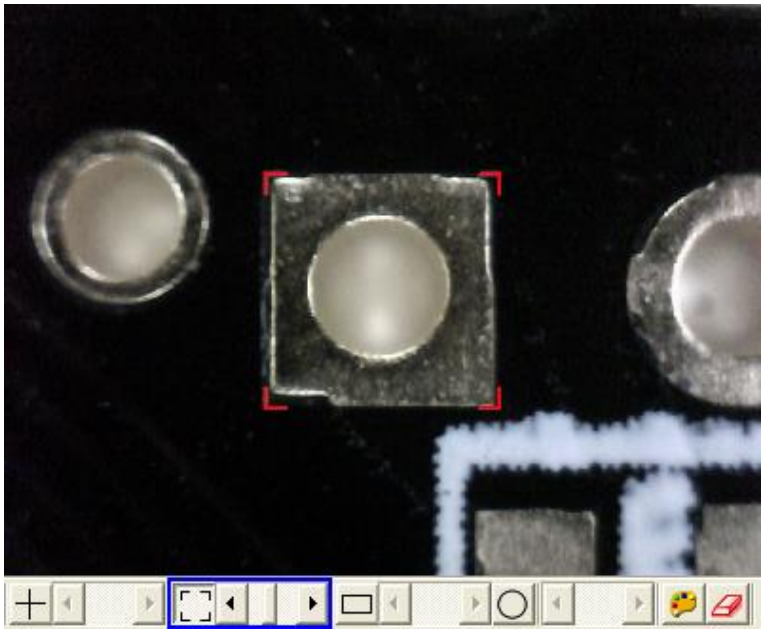

Fig.5-18 Draw area

5.2.3Draw rectangle “ ”

Click this button to draw the rectangle to adjust the size by the scrollbar. Show in Fig.5-19.

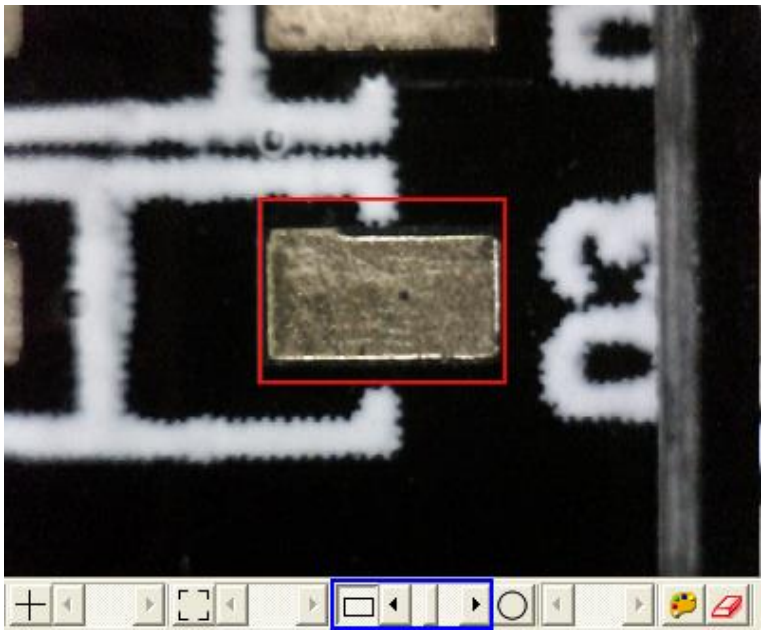

Fig.5-19 Draw rectangle

5.2.4Draw Circular “ ”

Click this button to draw circular to adjust size by scrollbar. Show in Fig.5-20.

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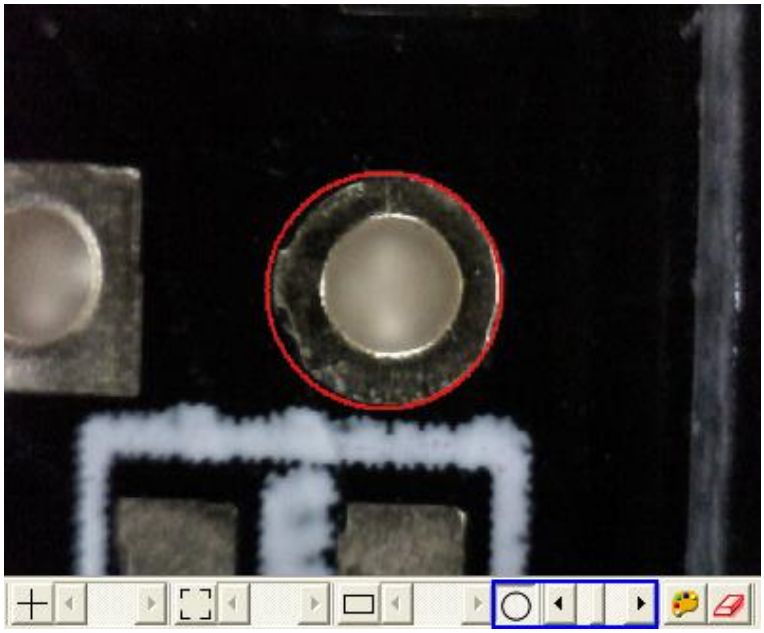

Fig.5-20 Draw Circular

5.2.5Choose aim point color “”

Click this button, will pop up choose color dialog box and from there to choose color.

5.2.6Clear aim point “”

To clear all aiming lines on fame

5.3 Video control and flip mode

This toolbar has the functions to flip image. The image will presented up-side-down when holding by left hand. By the mode, it can preview the correct direction. The brightness, contrast and exposure tool can be adjusted and also can cause the video image to be clearer in different scene. Fig.5-21 is the selection video control mode. Fig. 5-22 is the video control mode toolbar.

Fig.5-21 video control mode

Fig. 5-22 video control mode toolbar

5.3.1Right hand to look at observation “”

Right hand holds the microscope to look at observation or observes other people. The video image does not have any flip. This function is in normal way. See Fig. 5-23 right hand

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hold microscope to look at observing object.

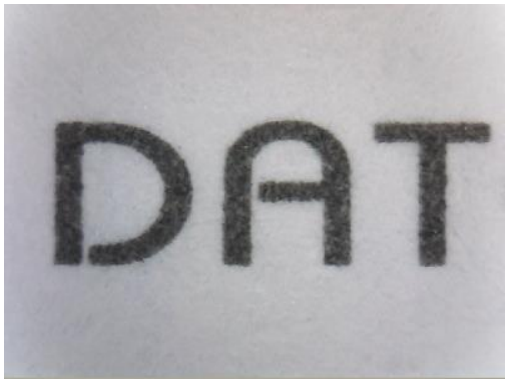

Fig. 5-23 right hand to look at observing object

5.3.2Right hand to look at yourself “”

Right hand holds the microscope to look at ourselves, when the user must watch oneself or use as a web-cam, then selects the “right hand to look at yourself”, it will flip the image vertically. Fig. 5-24 is right hand to look at self.

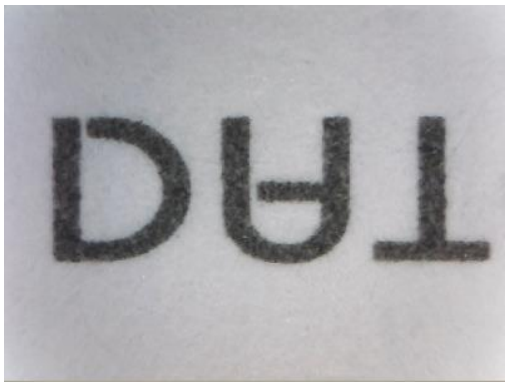

Fig. 5-24 right hand to look at your self

5.3.3Left hand to look at observation “”

Left hand holds the microscope to look at the observation or observes other people. When the right hand holds the microscope, selects this function, it flips the image vertical and horizontal. Fig. 5-25 is left hand to look at observation object.

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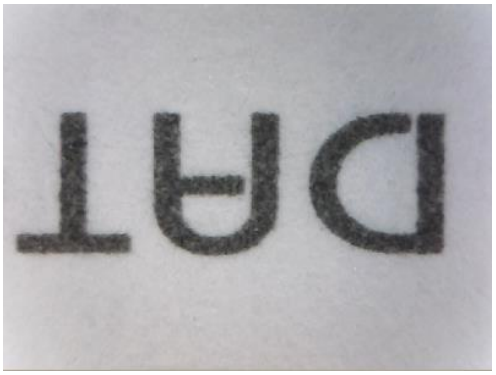

Fig 5-25 Left hand to look at observing object

5.3.4Left hand to look at yourself “ ”

Left hand holds the microscope and whiling to look at self as a web camera, the video image will flip left-right 180 degree. By this function it can flip correct directions. Fig. 5-26 is left hand to look at self.

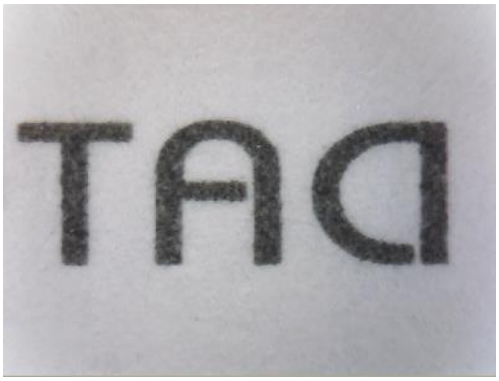

Fig 5-26 left hand to look at your self

5.3.5Adjust Brightness “ ”

To adjust brightness is to click the brightness button. Using scrollbar to adjust the brightness. If want to go back to default just click it again.

5.3.6Adjust Contrast “ ”

To adjust contract, just click the contrast button which can adjust by the scrollbar. If want to default just click it again.

5.3.7Adjust Exposure “ ”

When adjusting the exposure, click on the exposure button and to default just click it again. If this button cannot click, it means it doesn’t support this function. If adjust has no

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response, then go to “setting->video source”. The “auto mode control” must be unchecked. If want to use “auto mode control” must be checked again as shown in Fig 5-27. If the auto-exposure function would like to be active, please have this option checked. The drive doesn’t support the function, if the selection doesn’t show on the setting page.

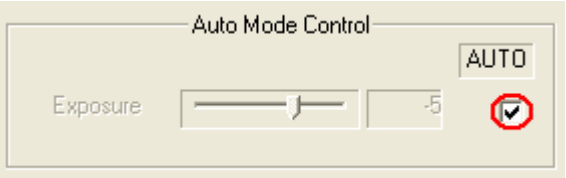

Fig 5-27 auto exposure mode control

5.4 Measurement mode

Measurement mode provides a scale which has built in scale allow you to draw ruler to measure observation object. Another way is to Freeze frame or loading image then measure. The measurement toolbar has line, circular, rectangle etc. Also, it can show length, area, radius, diameter…etc. See Fig.5-28. measurement mode; its toolbar shown as Fig.5-29.

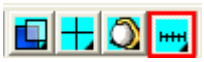

Fig.5-28 Measurement mode

Fig. 5-29 Measurement mode toolbar

Before measuring, make sure to calibrate the scale, please note “scale setting ” the explanation.

5.4.1Freeze frame “ ”

This function can freeze the previewing image. Once the image freezes, it can use measurement functions.

5.4.2Load image “ ”

The image which was captured before can be reloaded again. Users can use the measurement function after reloading the image.

5.4.3Save image “ ”

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After measuring, it can save image by clicking “save image ” button. The save file name will be marked as vertical and horizontal scale. If want to load the image to do measurement, then just click “scale setting ” button to set vertical and horizontal scale, the scale of value can be found form the file name. ie. If the file name is v420h560 means horizontal 5.60mm and vertical is 4.20mm.

5.4.4Copy to clipboard “ ”

Select “Copy to Clipboard ” button then the current frame will be copied to clipboard,also, it will be pasted to right sub-window [Fig.1]. After copying, it can be pasted on word or excel. Etc.

5.4.5Scale setting “ ”

(1) Select suitable ruler

Before setting scale, firstly find a more accurate ruler to measure. Commonly recommend to use metal ruler shown as Fig. 5-30.

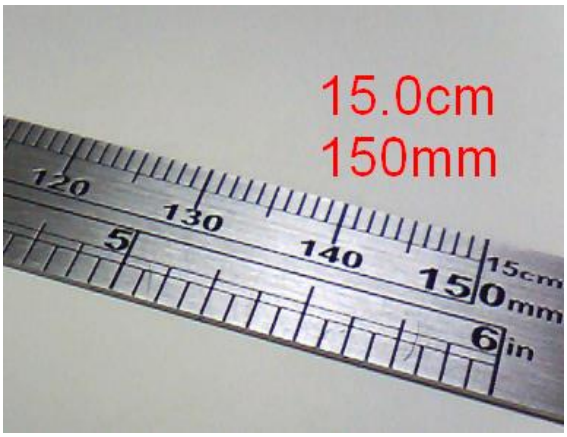

Fig 5-30 Metal Ruler

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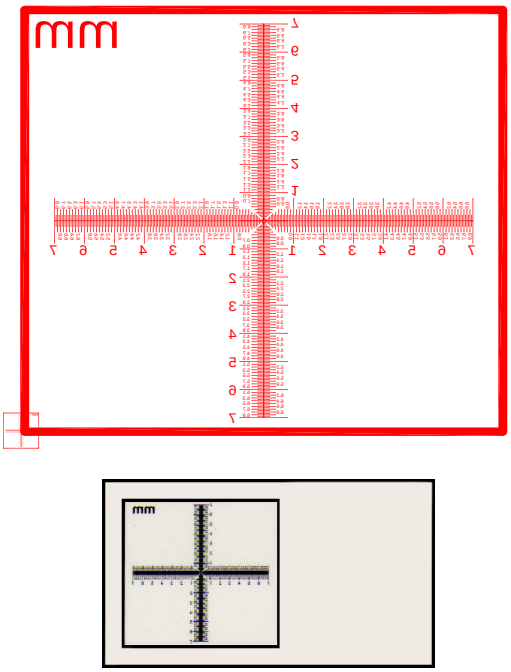

Fig. 5-31 Calibrator

Cross: The main purpose for the Cross is to calibrate the program and also as a measurement. The Cross (See above chart c) has 3 kinds of units as 0.05mm, 0.1mm and 1mm scale. It will measure 0.05mm, 0.1mm at high magnification and 0.1mm, 1mm at low magnification. The Cross can measure the Length and Width accurately, ie.: Fig 5-31, Measure the length of the onion cell as the red rectangle which is approximate 0.400mm.

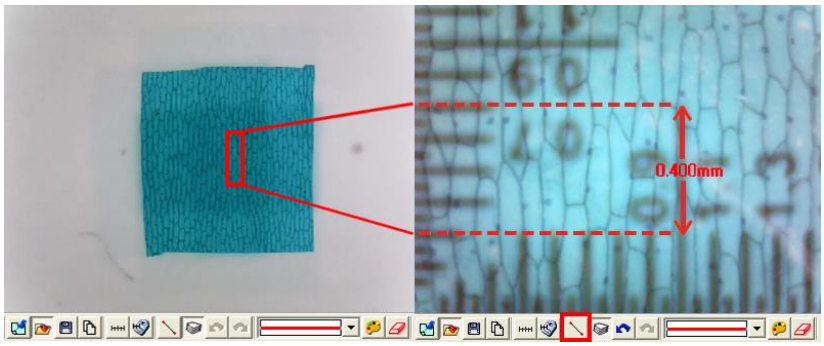

Fig . 5-32 The Cross

a. 0.1mm High Magnification Grid: See Fig 5-35, put the 0.1mm scale (See above chart d) on "" microdot. The Length of in a square i.e. 0.100mm.

The more accurate the ruler, it's more possible to calibrate correctly. The use "metal ruler" and "calibrator" the biggest difference is as follows:

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- When the magnification is high, use the calibrator can easily and accurately knows the scale range.
- When the magnification is high, metal ruler is less accurately than a calibrator.
- When the magnification is low, a metal ruler can be suitable.

(2) Calculate scale range

First, the scale setting must be calculate the horizontal and vertical scale range, the following has several steps to decide the scale range. It is suggested that to adjust the window size to a single 640*480 window：

- To decide measure distance between machine and observation objects.
- To adjust the focus to see the image as clear as it can.
- Calculate the observation preview image of horizontal and vertical scale. Calculate the range shown in Fig. 5-36.

After setup the horizontal and vertical scales, the machine, the observation distance and focus are not allow to readjustment.

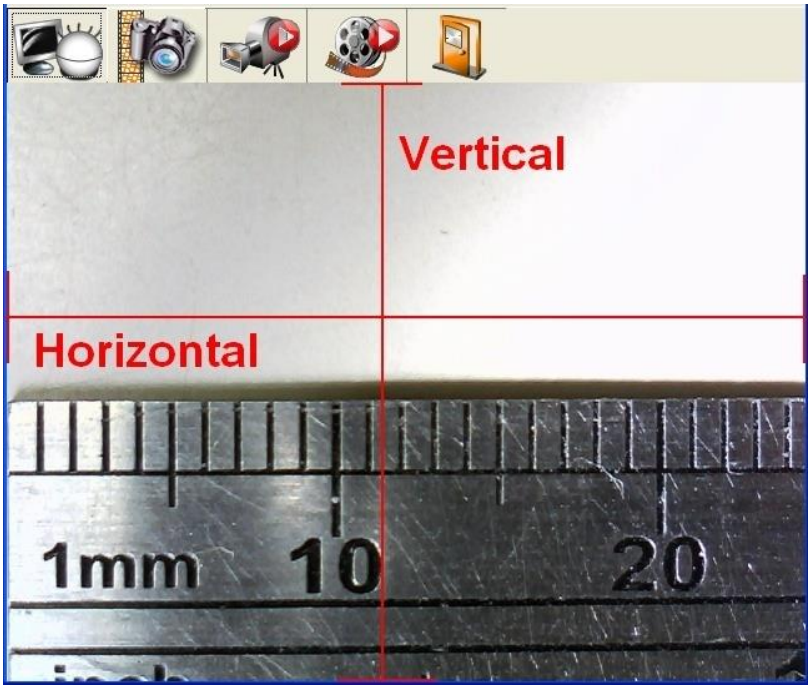

Fig. 5-33 Horizontal and vertical measurement range

(3) Calibrate “contacted and “non-contacted” scale

- Contacted scale: Put the machine onto the calibrator for small field of view, it can apply for a focus point at Low or High magnification.
- Non-contacted scale: To hold the machine by the supporter, fix the machine overhead a ruler for a certain distance, it can observe a wider field of view.

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Non-contacted scale is only for low magnification. See Fig 5-37.

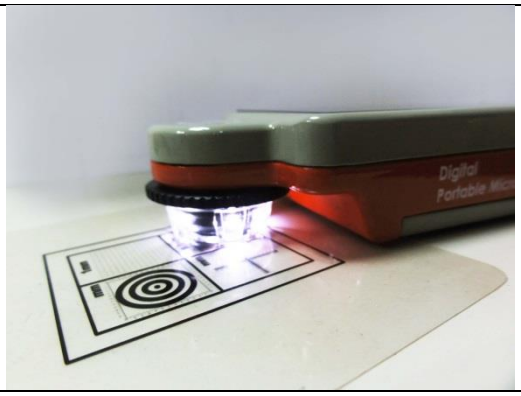
Contacted	Non-Contacted
	

Fig. 5-34 Contacted and Non-Contacted

According to the above steps it can measure horizontal and vertical scale. Several examples as follows:

EX1: Measurement for non-contact object.

Use the "metal ruler" as a measurement base, the distance between machine and the observation object is (H) 2.2 cm, then, adjust focus to see the clearest image. Image results as shown in Fig.5-38 and Fig.. The measured horizontal and vertical scale is 24.2mm and 18.1mm.

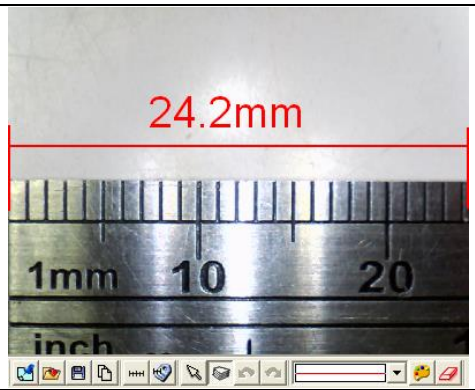
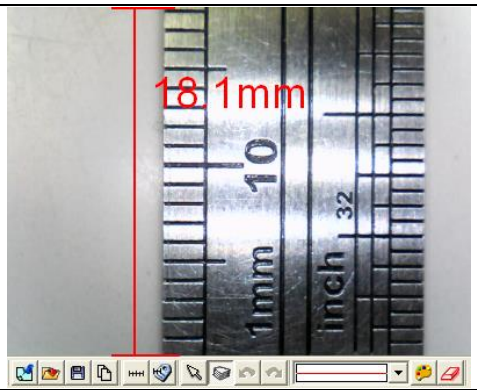
	

Figure5-35 horizontal scale range 24.2mm	Figure5-36 vertical scale range 18.1mm

EX2: Measurement for contacted object in low mag.

Use the "metal ruler" as a measurement base, flatly put the machine on the observing object, adjust the focus to find the clearest image. See Fig.5-37 and Fig.5-38 the result from measurement. Horizontal and vertical scale is 5.60mm and 4.20mm.

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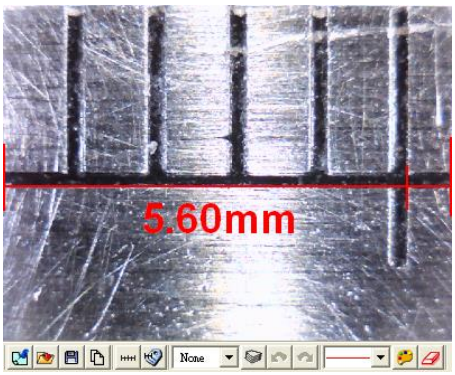	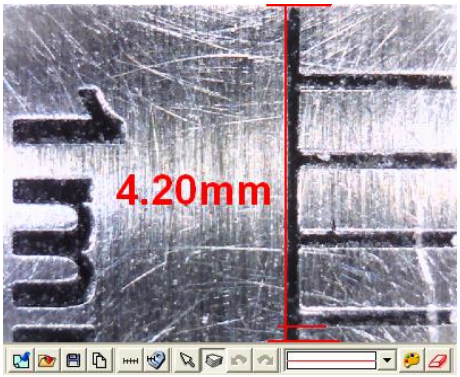
Figure5-37 horizontal scale range 5.60mm	Figure5-38 vertical scale range 4.20mm

EX3: Measurement for contacted object in high mag.

Use the "metal ruler" as a measurement base, flatly put the machine on the observing object, adjust the focus to find the clearest image. See Fig.5-39 and Fig.5-40 the result from measurement. Horizontal and vertical scale is 1.40mm and 1.05mm.

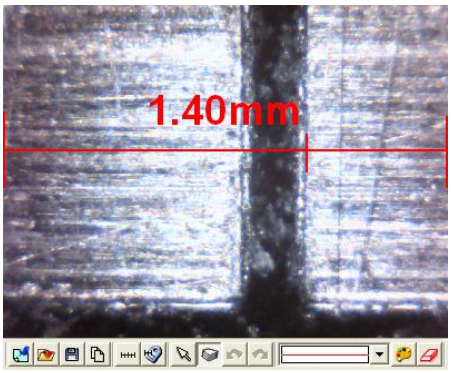	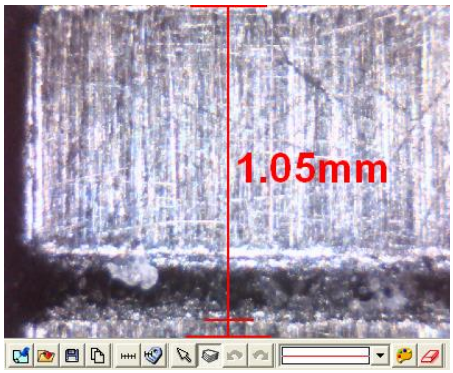
Figure5-39 horizontal scale range 1.40mm	Figure5-40 vertical scale range 1.05mm

EX4: Calibrate the scale for contacted in low mag.

Use the "calibrator" as a measurement base, flatly put the machine on the observing object, adjust the focus to find the clearest image. See Fig.5-41 and Fig.5-42 the result from measurement. Horizontal and vertical scale is 5.6mm and 4.20mm. Using a calibrator is more easily and accurately to get scale range.

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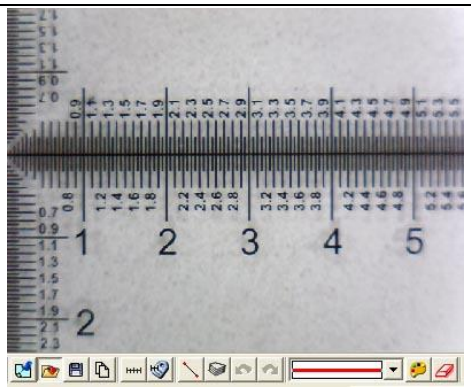	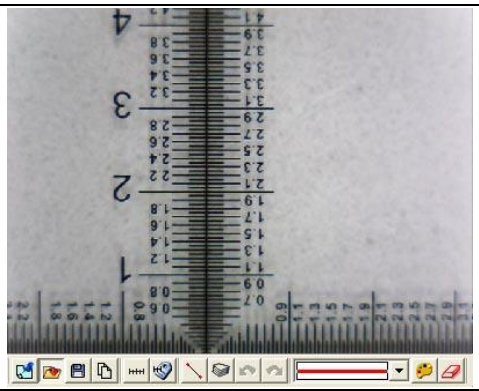
Figure5-41 horizontal scale range 5.60mm	Figure5-42 vertical scale range 4.20mm

EX5: Calibrate the scale for Contacted in high mag.

Use the "calibrator" as a measurement base, flatly put the machine on the observing object, adjust the focus to find the clearest image. See Fig.5-43 and Fig.5-44 the result from measurement. Horizontal and vertical scale is 1.40mm and 1.05mm. Using a calibrator is more easily and accurately to get scale range.

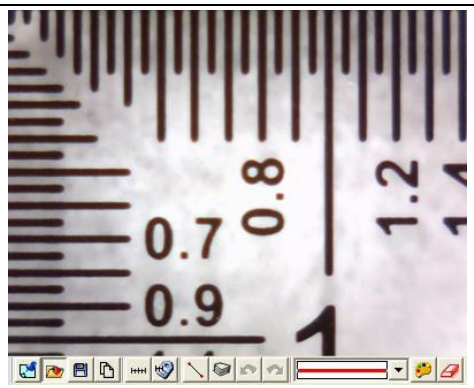	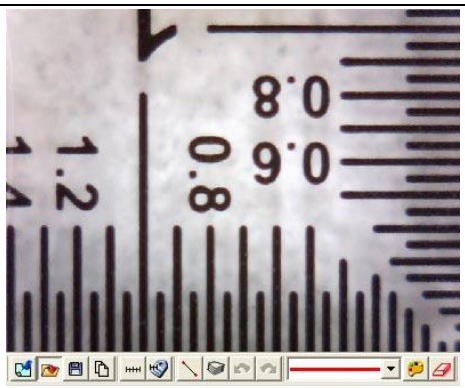
Figure5-43 horizontal scale range 1.40mm	Figure5-44 vertical scale range 1.05mm

(4) Factors cause the inaccurate on the measurement

There are few factors could cause the inaccurate on the measured figures.

- The used ruler is not exactly accurate, for example, a metal ruler is not accurate than a calibrator.
- Because of the discrepancy, it is unable to know the accurate horizontal and vertical scale range, too.
- The resolution is not the same with the Windows size.

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Why is the resolution not the same with the Windows size? For example the present resolution (original video image of output size) is 640*480 the measurement of the Windows's for general is 400*300 sizes. When the original video image size is 640*480 by reducing to 400*300, the measurements will have caused error. Therefore, the measurement is to adjust the resolution size and windows size to become the same. To chooses the application toolbar. “Setting-> video format” will pop up shown in Figure (Fig. 5-45), to change ”output size” value then, this output size expression video source resolution.

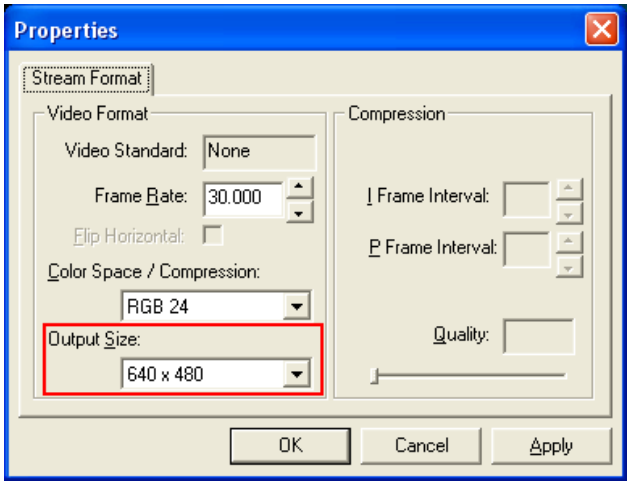

Fig.5-45 Resolution adjustment

Another window adjusts as shown Fig.5-46 below.

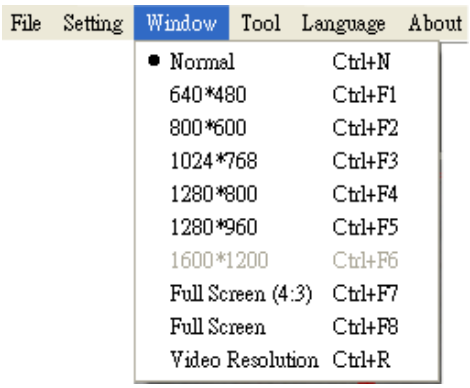

Fig.5-46 window size adjustment

(5) Setting scale

The setting scale dialog box show in Fig.5-47. The following several to explain operation

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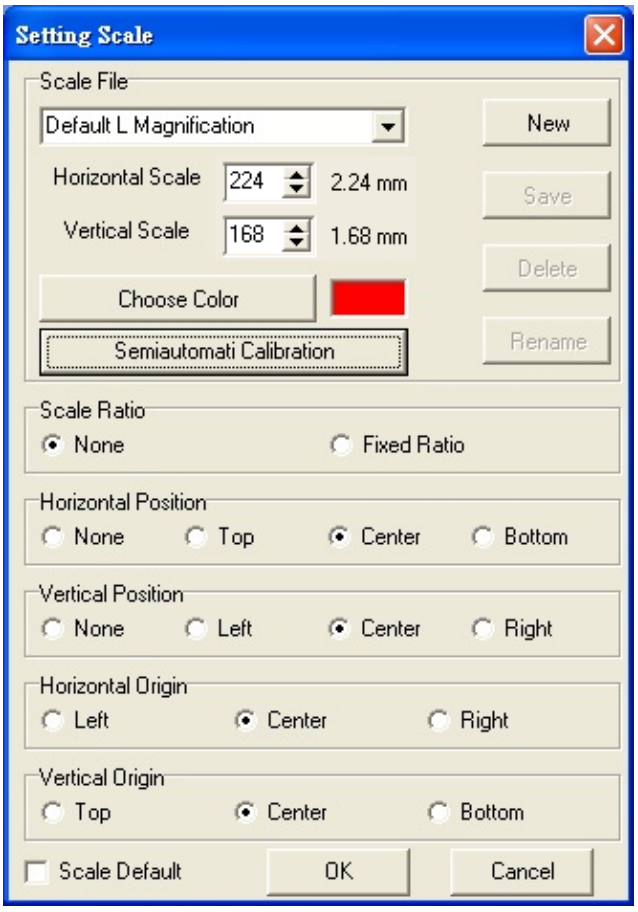

Fig.5-47 Setting scale dialog

- Scale default file

  Scale default files have two types “Default Height Magnification” and “Default Height Magnification” shown in Fig.5-48

Fig.5-48Scale default File

When the microscope is observing object with contacted distance, it has two focus points. Thus, it will have two kinds of scale value which are for low and high mag. When in low mag, the horizontal and vertical scale is 2.24 mm and 1.68mm. And when in high mag, the horizontal and vertical scale is 0.56mm and 0.42mm. If the default value is not right for the user, the scale value can reset or create a file for new value by calibrate the horizontal and vertical scale according to the user’s preferences.

If want to return the default value, chick “Scale default” box than it will delete the new add file and return to the two default setting.

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- Create a new scale file

  Click “new” button than it will pop up shown in Fig.5-49 a dialog box and input a new scale name.

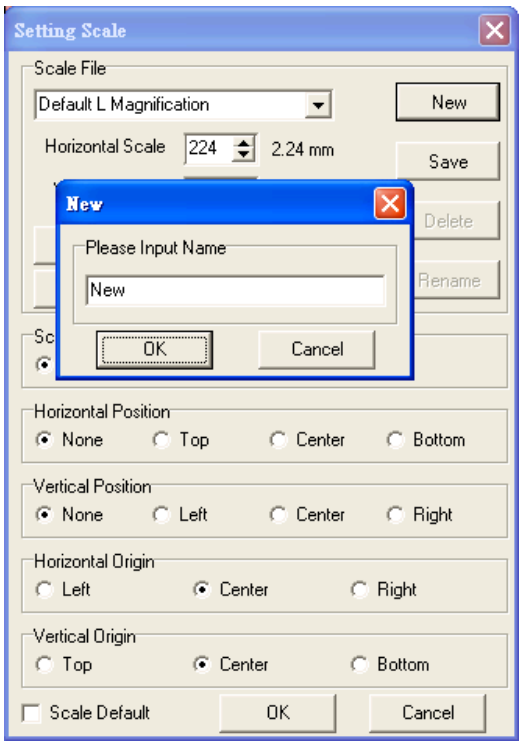

Fig.5-49 New scale name file dialog

After creating a new file, input vertical and horizontal’s scale value shown in Fig.5-50 and if want to change scale color, select “choose color” button to change color.

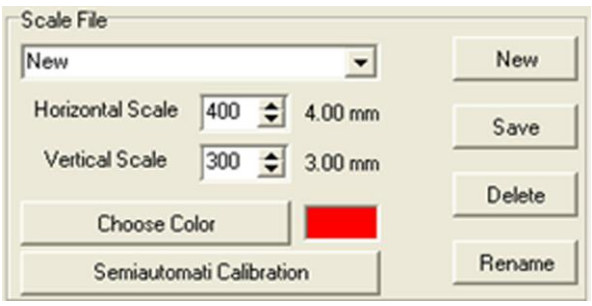

Fig.5-50 Input vertical and horizontal scale value

- Scale ratio

  The machine’s Sensor of image ratio is 4:3, if checked fixed ratio, then the horizontal and vertical scale will make the adjustment by 4:3 ratio, shown in Fig. 5-51. For example, input in the horizontal scale value to 410, the vertical scale

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value will automatically adjust to 307.

On the other hand, due to the AP will automatically calculate the scale range for horizontal or vertical scale, thus, the user just need to measure and enter one of the horizontal or vertical scale. i.e., while only measure and enter the horizontal scale range, it can calculate the vertical scale range automatically.

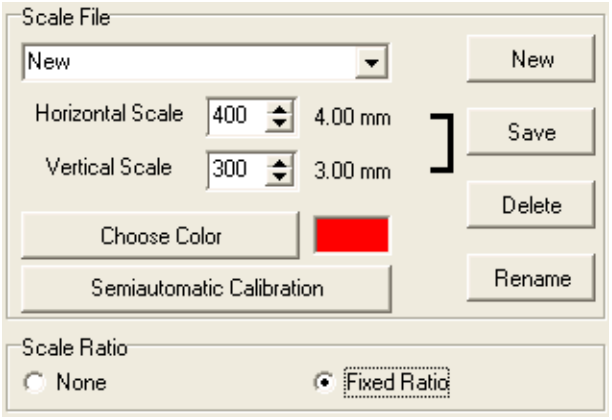

Fig.5-51 Fixed ratio adjustment

- Set ruler position & show (0,0) position

The scale displays the horizontal and vertical scale of the ruler. If "none" is selected, the scale will not be shown. The point of origin is the starting point of scale. If the horizontal location is set in the middle and the vertical location is set on the left, as shown in Fig. 5-52. And the horizontal origin is set on the left while vertical origin is set in the middle, the scale presented as Fig. 5-53.

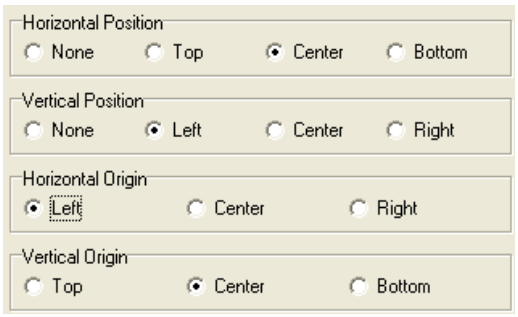

Figure5-52 Ruler position setting

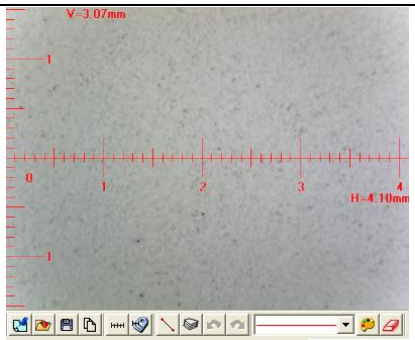

Figure5-53 Ruler vertical and horizontal Display

- To set up the horizontal effective range

As shown in Fig. 5-54, there're two options for horizontal effective range setup. The default setting is auto-detection which is able to define the effective display. If the detected value is "0", or adjustment required, the manual adjustment function is also available. There are different unit options, cm and inch, available in manual adjustment mode.

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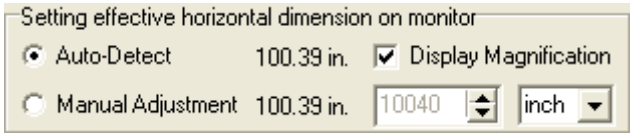

Figure 5-54 Setting effective horizontal dimension on monitor

When the "magnification display" is checked, as shown in Fig. 5-54, the magnification ration will show on the upper right corner of the display window based on display size, image resolution and preview window size. The ratio is calculated by Field of View. Field of View is the calibrated horizontal and vertical scale. Users could also calculate the ratio by rulers, please refer to Fig. 5-56. The displayed 1.00 mm equals to 16.2mm ruler scale, therefore, this is 16.2 times the actual size.

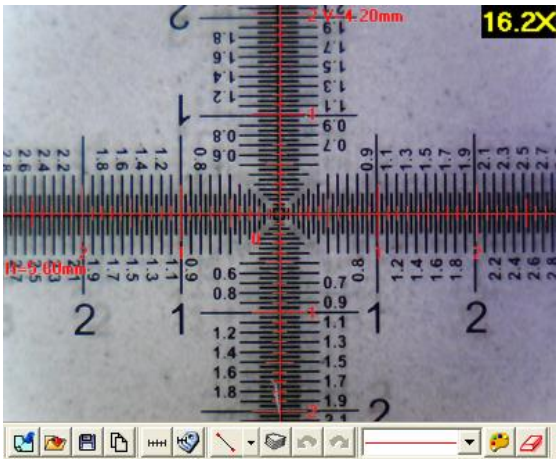

Figure5-55 The magnification ratio on the upper right corner

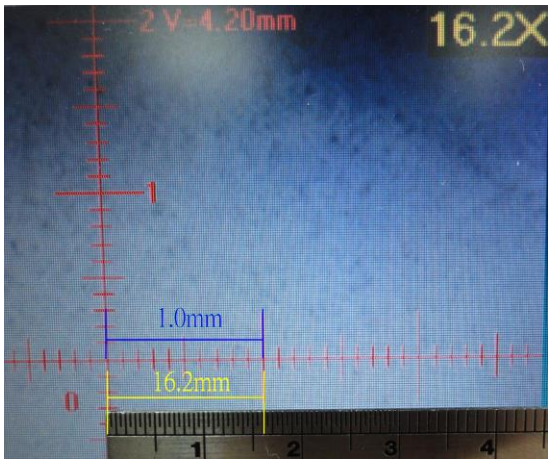

Figure5-56 measure ratio by ruler

- Ratio displayed on the picture

  Fig. 5-57 shows the options for ratio display. Choose the display way first, then click 「 」 in measurement mode to save the picture, the ratio will be saved and shown on the upper right corner; or click 「 」 to copy the preiviewed image to previewed picture. If "monitor" is selected, the ratio displayed on the picture is calculated by current image size and Filed of View. If "print" is selected, the ratio is calculated by current image size, Field of View and printing resolution (the default setting is 960dpi). If "both" is selected, both of the ratio will be displayed as Fig. 5-58. The "S" represents screen ratio while "P" represents printing ratio.

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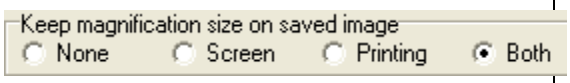

Figure5-57 Setting of picture magnification ratio display

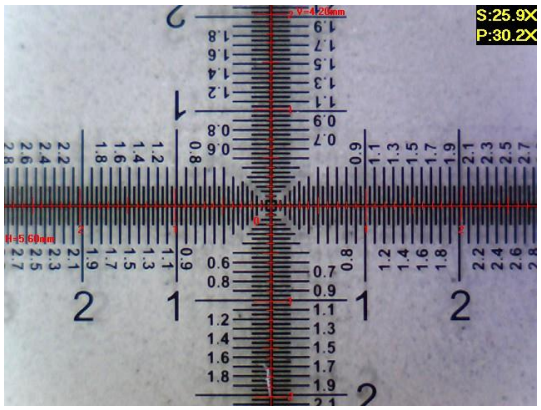

Figure5-58 Saved ratio

- To delete and rename scale file

  Choose delete or rename the file from the drop down menu, see Fig.5-59. Then click "delete" or "rename".

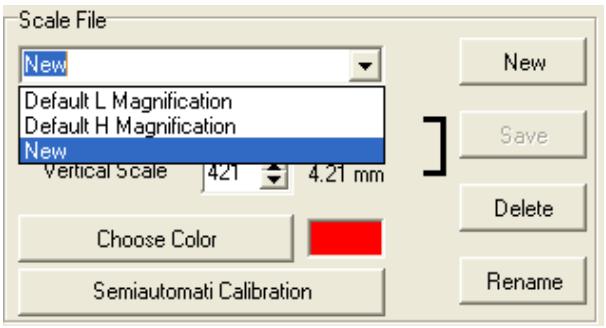

Fig.5-59 drop down menu choose file

- Semi-Auto Calibration

  Set up a customized semi-auto Calibration. See Fig 5-60. "Input Measurement Length" means the real length. For example, enter 400 means 4.00mm, enter 50 means 0.5mm. The Display Scale check-box is to decide to show the Display Scale or not. If click the Horizontal Fixed, only a horizontal axis can draw on the image; on the contrary, if click the Vertical fixed, only a vertical axis can draw on the image. If choose "None", axis can draw from any direction. A horizontal or vertical axis can be draw by pressing 'shift' button on your keyboard together with clicking mouse left. After it is completed , please click "Finished" for saving the new scale.

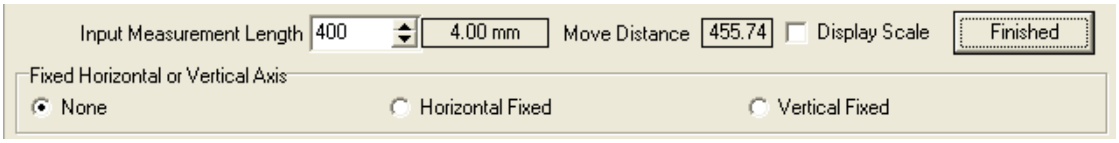

Fig 5-60 Input the actual measurement length

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The calibration frame can be freeze by pressing the right button on the mouse. The freeze frame helps for calibrating in a stable condition.

(1) put the calibrator under the machine and adjust focus to clearly see the scale.

(2) Key in “400” length in the check-box of “Input Measurement Length”.

(3) Use mouse to draw a yellow line for 4.00mm.

(4) Click “Finished” to complete and save the new calibration figure.

The new setting scale (Calibration Scale [New]) show on the frame. See Fig5-61.

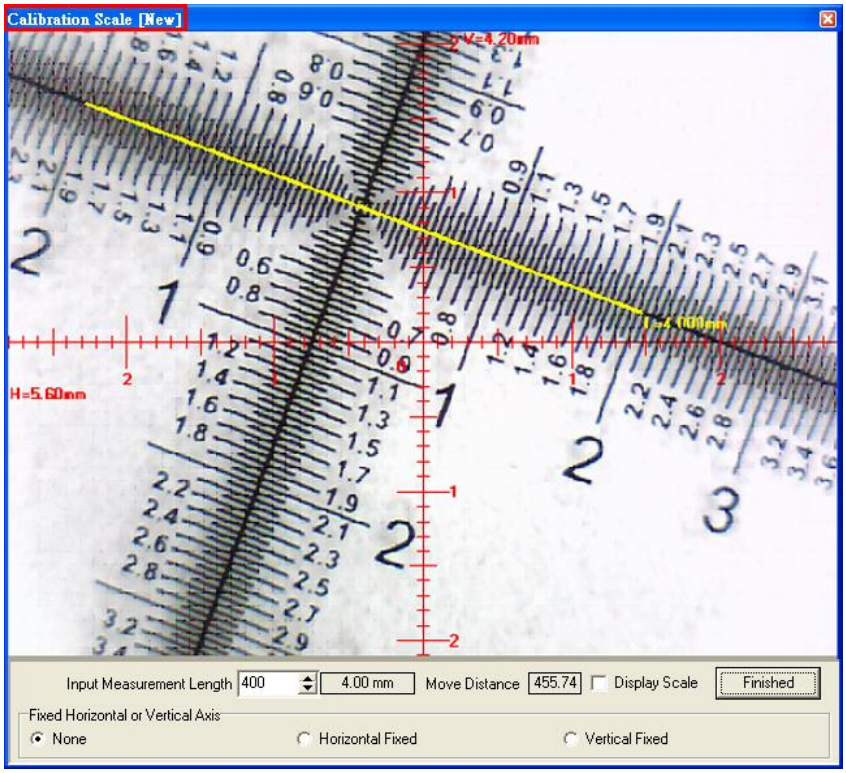

Fig 5-61 Draw a line in actual length

5.4.6Setting measurement Information “”

This setup screen indicates to set whether to show the unit value or not, see Fig. 5-62. Choose “length” means to display the length of the line, by capital letter “L” expression, if length is 2.33mm, it will show L=2.33mm besides the line. If choose “none”, no value will show on the dialogue. If show “P” means “perimeter”, “A” means “Area”, “C” means “Circumference, and “R” means ”radius” .

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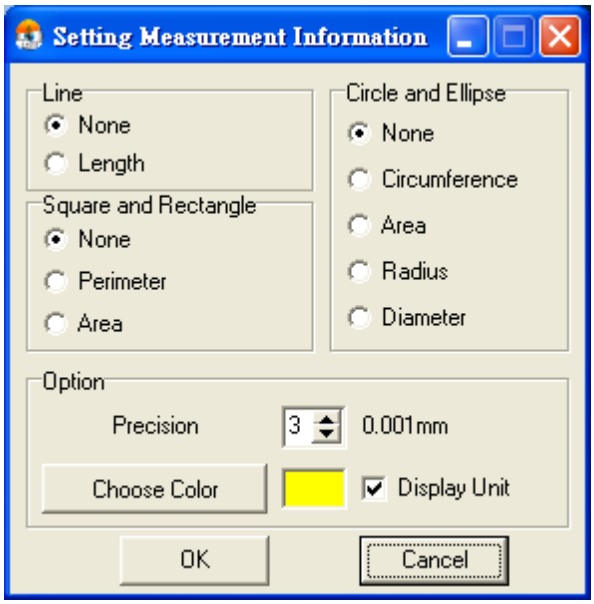

Fig.5-62 Scale information setting dialog

The "precision" refers to under the decimal point of effective number of digits. The effective number of digits can be adjusted. "Choose color" may choose the text color. Click "Display unit" means to display the unit value (mm). Note: due to the default measurement style is "none", when the setting measurement information is done, it is important to choose the measurement style to display the measurement unit.

5.4.7Measurement tool styles

The measuring include optional Line, 2 Points Circle, 3 Points Circle, Ellipse, Square, Rectangle, 3 Points Angle, 3 Points Fillet, 4 Points Angle for variable demand as shown in Fig. 5-63.

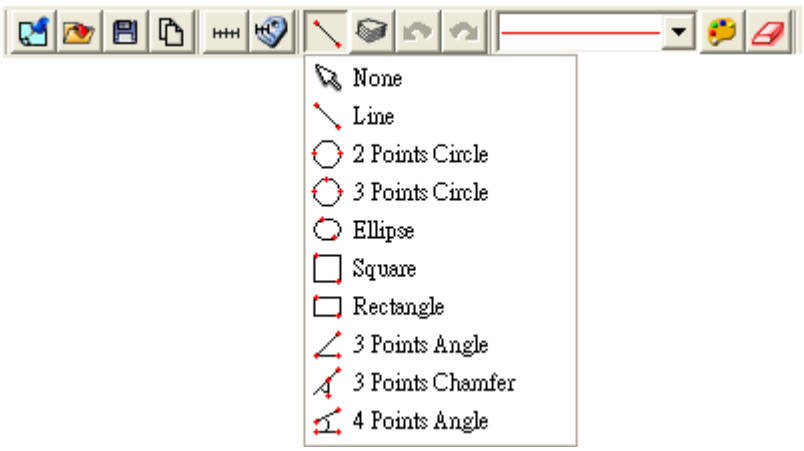

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Fig.5-63 Measurement Tool Styles

(1) Line: Measure the Length and use . See Fig 5-63.
Firstly choose Fig.5-63 Scale information setting dialog. Measure the Length on the PCB rectangle, choose the “line” icon, then draw a line, the “ L” means Length. Ex: L=5.510mm as Fig. 5-64.

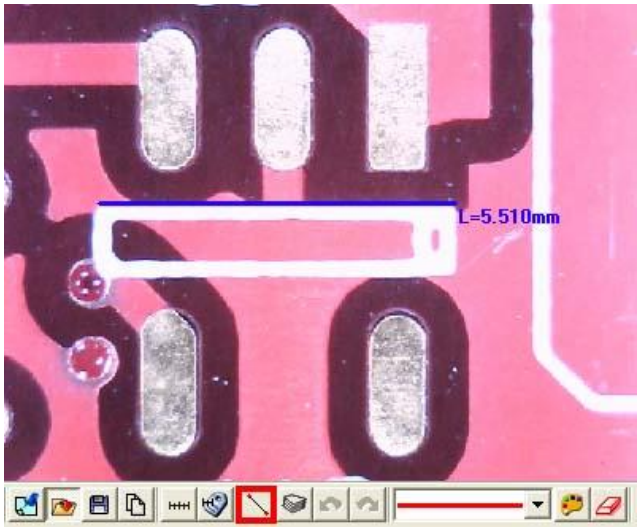

Fig 5-64 Length measurement

(2) 2 Points Circle: Measure the round object can use . Firstly choose Fig.5-63 Scale information setting dialog. To point any dot on the circle, pressing the left button of the mouse and drag the line to another point on the circle. It should automatically calculate C: Circumference, A: Area, R: Radius, D: Diameter. See 1st circle: C=2.276mm, 2nd circle: =0.412mm2, 3rd circle R=0.716mm, and 4th circle D=1.467mm as Fig. 5-65.

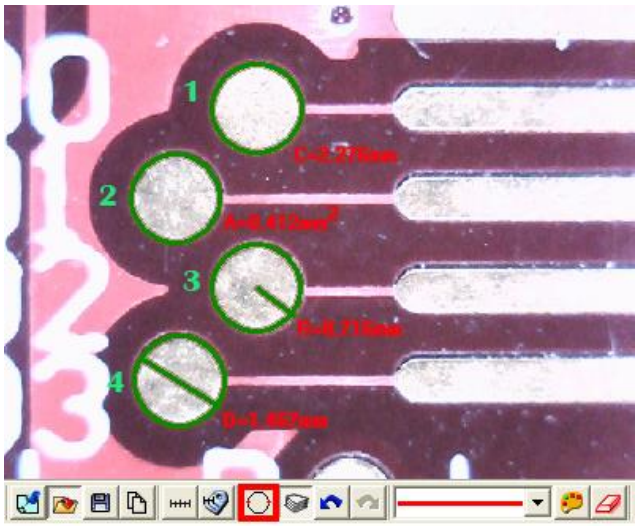

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Fig 5-65 2 Points Circle Measurement

(3) 3 Points Circle: See an arc or a circle shows on the observation only and need measure the circle, it can use . Firstly choose Fig.5-63 Scale information setting dialog. To point any point on the edge of an arc, draw a line to second point, then drag the line to the third point on the same arc, to automatically calculate a correct circle. The said 3 points on the arc to be necessary a triangle. See Fig 5-66, the figure can be measure as 2 Point Circle. 1st circle: Circumferences C=2.409mm, 2nd circle Area A=0.450 mm^2, 3rd circle: R=0.727mm, 4th circle: D=1.480mm.

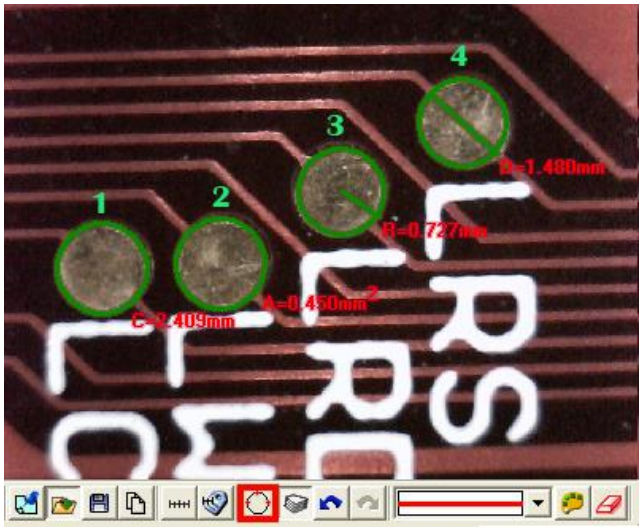

Fig 5-66 3 Points Circle

(4) Oval: Measure an oval circle and use . Firstly choose Fig.5-67 Scale information setting dialog. To point any dot on an oval, pressing the left mouse button, and drag to fit the oval on an observation object. Same methods as Circle to be measured for 2 Points Circle and 3 Points Circle, 1st oval C=6.703m, 2nd oval A=2.947mm^2, 3rd oval: lR=1.328mm, sR=0.714mm, 4th oval lD=2.826mm, sD=1.428mm.

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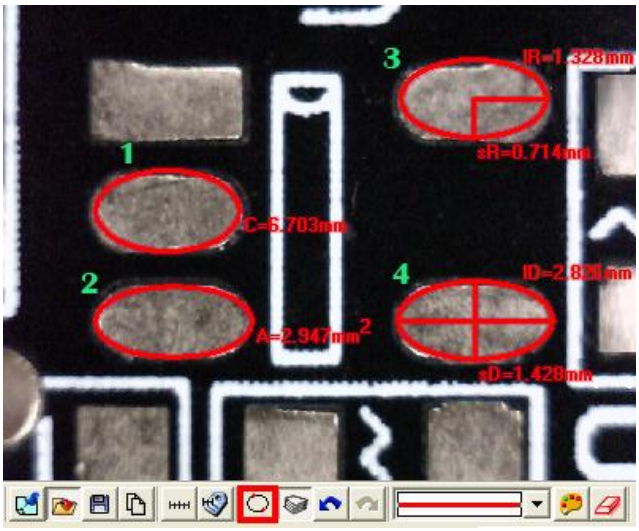

Fig 5-67 Oval

(5) Square: To measure the object is a parallelogram, it can use . Firstly choose Fig.5-63 Scale information setting dialog. To point one dot on the angle, pressing the left mouse button, and drag the diagonal to make a square and fit the observed object. See Fig 5-68 , P：Perimeter, A: Area, see Fig 5-68, the top square on left P=7.295mm, the bottom square on left A=3.587 mm^2.

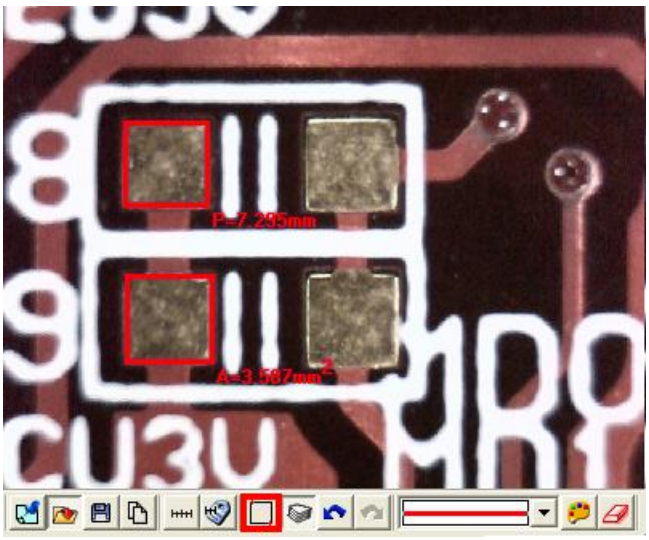

Fig 5-68 Square

(6) Rectangle: Measure a rectangle and use . Firstly choose Fig.5-63 Scale information setting dialog. To point one dot on the corner, press the left mouse button, and drag the diagonal to make a rectangle to fit the observed object. See Fig 5-69, P：Perimeter, A: Area, see Fig 5-69, the top rectangle on left P=10.308mm, the bottom rectangle in the middle A=1.940 mm^2.

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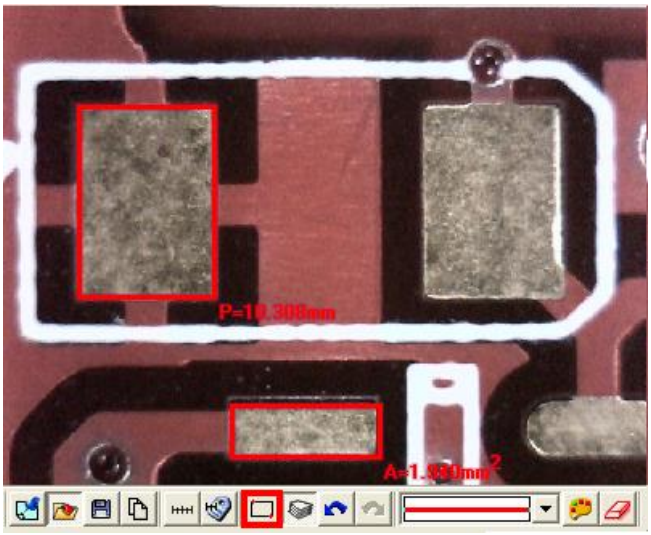

Fig 5-69 Rectangle

(7) 3 Points Angle: Measure the angle on the object and use . In Fig. 5-70, it can see an angle on the object, draw a line and stop at the corner of angle, and then draw the other line from the angle; the angle can be automatically calculated. a dot shows the measured angle, it is 135.5 °.

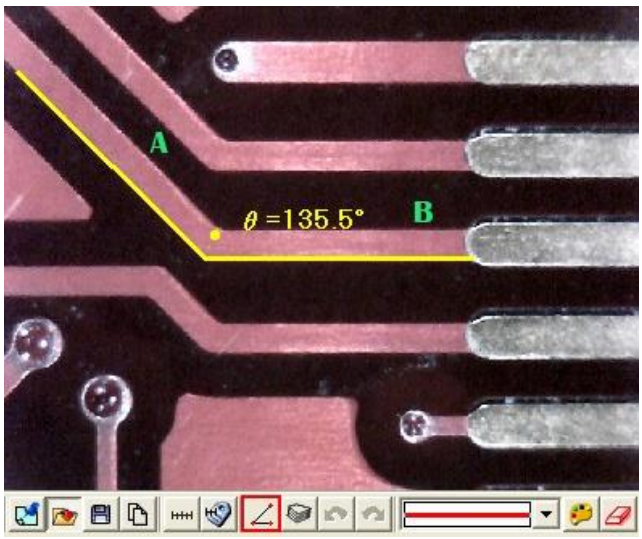

Fig 5-70 3 Points Angle

(8) 3 Points Fillet: Measure charm and use . Draw first line on the angle (see line A) and press the left mouse button to drag a line on the other side of the angle (See line B) to calculate the chamfer. See Fig 5-71. There is a small dot inside the chamfer and shows 45.8°.

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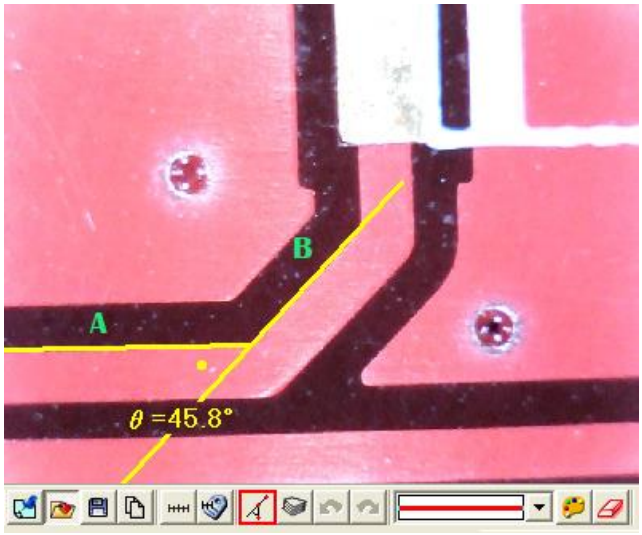

Fig 5-71 3 Points Fillet

(9) 4 Points Angle: Use to measure an angle but only see 2 unparallel lines shown on the object. See Fig 5-72, to draw a 1st line from the object (see line A), and to draw the other unparallel line (see line B), the angle can be automatically calculated. See Fig 5-72. There is a small dot show 45.3°.

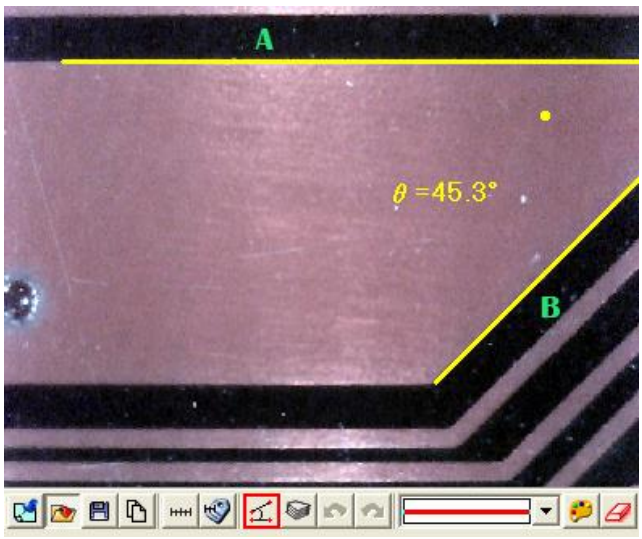

Fig 5-72 4 Points Fillet

5.4.8Draw overlap line“”

While selecting this function, it can be drawn many times in the fame. After clicking “draw overlap line” undo or redo can be used show in Fig 5-73, if not selected it only can repeat drawings.

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Fig. 5-73 Overlap tool

5.4.9Undo “ ”

Undo function that can go back to the movement.

5.4.10 Redo “ ”

Redo function can also go to the next movement.

5.4.11 Line styles

There are lines styles shown in Fig. 5-74 and can choose different lines.

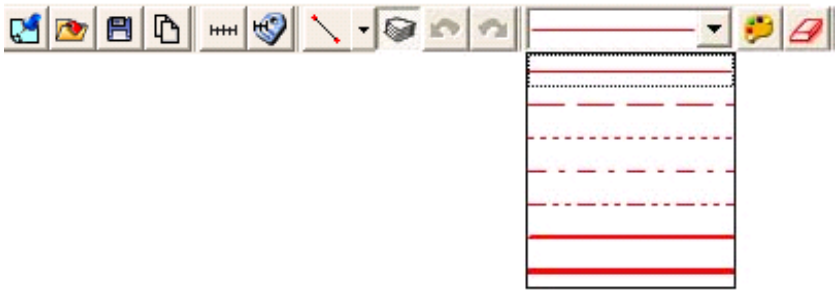

Fig. 5-74 Line styles

5.4.12 Choose color“ ”

The tool can select colors to become different color. The line and background color can’t be similar.

5.4.13 Clear frame“ ”

Clear all things that are drawn on the fame. “Undo” and “Redo” record will be erasing.

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