## **TMR-200 Taping Machine Vision**

## **Checking Instructions**

## **Preface**

Congratulations on choosing the TMR-200 Automatic Taping Machine. This manual shows how to easily program and setup the machine for the best results. Make sure to read this manual carefully before using this product, so as to avoid delays or confusion with its operation. Please note that specifications and instructions are subject to change without notice to facilitate product improvement. Updates and changes will be integrated into the latest release. The manufacturer assumes no responsibility for any errors or omissions in outdated documents.

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## 1. Interface Testing

In main menu you can click 【INTERFACE TESTING】 button, like this

🥅 Check finshed	
☐ NG	
🖵 CCD Ready	

The external hardware interface of the detection software mainly includes three:

- The test completion signal, which belongs to the handshake signal to the PLC, the output, indicates that the detection flow has completed the specified action, the PLC can collect the related detection result signal; Click on the "test complete" check control of the interface test window, if selected, then detect the valid signal sent out, otherwise it will send out the invalid signal
- The output signal of the product detection result NG, output, indicating the detection result, If the NG sends out a valid signal; Click on the [product NG] check control of the interface test window, if selected, send out the NG effective signal, otherwise send out the invalid signal;
- The acquisition signal of the CCD industrial camera (external trigger control signal), input; External trigger signal detection: the main screen point [start detection], enter the detection process, click the PLC [pause] button, screen to generate updates to explain the external trigger work. Otherwise, external trigger interface failure. Check out, click exit to return to the main screen

## 2. Running the program

Click "MSChecker" on Desktop or running program in D:\mschecker\mschecker.exe.



If the system starts the hardware detection normally, the main screen show is as follows:



KRD & MSvision MSChecker For IC Ver1.0.0.29			- 🗆 X
ET 23 14	OFOGET	Curr Result	NG list V Absense Vaiting V Loc Err NO Chec V Type Err Vaiting V Dir Vaiting V Foot Self Vaiting Type Simularity Color V Err
Select Set Hedd Another		Dir Simularity Totle Area Foot Data Stat Da No R S 2G 2G 2G 2G 2G 2G	PointsNum Max area le/ Last HG Image iotic Sample Last Image Save td C Std ^
Product Type	Stop Check	26       27       28       29       29 </td <td></td>	
Auto Checking Start Running		Loc Prog	×

## 3. Check setting instruction

## 3.1 Setting instruction

In the main menu, it include 5 main parts:

R	Select PROG	Set Model	Another Model	Test IO	Manual Test	Jump	Chines/English
-Product Type-				Å	uto Checking		Esc Prog
register	Modle	Ready					☐ Loc Prog

- Select PROG: The management of different testing products is convenient for the switching of different types of products;
- Set Model: it is the sample setting, Check parameters can be adjusted during detection, if the modified parameters are not appropriate, you can call this

function to re-call the previous correct parameters;

- Test ID: Hardware IO testing;
- Jump: Perform the detection operation when the result of the NG, needs to be ignored;
- English and Chinese switching;
- Esc Prog: Withdraw from the program.

Detection setting is a very important part of detection. Generally, the reliable and stable operation of detection depends on the collection of samples and the selection of parameters. First of all, the premise of detection should be a clear and stable photographic image, secondly, a correct and clear standard sample, and finally a suitable parameter.

Normal setup steps:

- (1) Choose a better product and put it under the camera.
- (2) Adjust the camera parameters to ensure that the camera is stable, consistent and clear.
- (3) After the image adjustment is completed, return to the main interface, click on the center of the sample with the mouse, and adjust the size of the detection template according to the size of the sample, so that the size of the circle of the template changes, so that the circle is 1 / 4 larger than the sample.;
- (4) Click on the settings button in the main interface to create a preliminary sample.
- (5) The parameters of the parameter interface can be adjusted by clicking on the per-detection. (12) it is usually possible to use the correct sample statically to check for false judgment, and to use the wrong sample to detect the omission. Misjudgment is the original product of OK, but NG, detection is not detected defective. Then adjust the parameters.
- (6) Dynamic test run.
- (7) The test parameters are preserved if the procession is carried out stably.

The program: here is a particular work-flow that performs different functions under different conditions. The setting of the detection program is the monitoring process and content, as well as the setting of the detection parameters.

Threshold: in image processing, the gray level segmentation parameters used to

distinguish the detection features are simply the basis of judgment. Each pixel of the image is represented by 8-bit data, which is 0-255, the gray value of each pixel. Is 0-255, for example, we specify that the gray value of more than 120 pixels as the bright spot, less than the normal point, then 120 is the normal value of the super bright spot segmentation;

Accept permission: image detection algorithm for each detection object, will be assessed according to certain scoring rules, get a 0-100 test score, accept permission, the equivalent of a few lines, if the license is 60, So it undefined 60. Over 60 is OK, below 60 is NG;. Acceptance permits can be set according to the degree of rigour of the test and the degree of difference in the object.

Output delay: when the detected object passes through the camera, the sensor triggers the camera to take pictures, the camera receives the photo, and the detection begins. When the detection is completed, the result is reported, and the culling action is carried out. In order to ensure the cooperation of each link in the detection process, we sometimes need to adjust the time sequence of the culling, that is, after getting the detection result, how much time delay will release the time parameter of the culling signal, in milliseconds.

Output holding: in order to cooperate with the PLC control, it is necessary to remove the signal with a certain pulse width, so there is the culling hold time, also in milliseconds.

Detection range: search the detection object in the whole image, because of the image interference and the use of mechanical positioning, track, fixture and so on, determine the detection range, can ensure the detection object, in the lens of a fixed area, In this way, the detection in this area can improve efficiency, save time, and eliminate interference to improve reliability.

The detection procedure was divided into 0-10 and 11 steps:

- (1) Camera parameters set;
- (2) Set the scope of work;
- (3) Positioning template setting;
- (4) IC model test setting;
- (5) IC direction parameter setting;
- (6) Setting and testing of positioning parameters;
- (7) Direction detection parameters;
- (8) IC model identification parameters;
- (9) IC type words with incomplete parameters;

- (10) Pin 1 setting (custom);
- (11) Pin 2 settings (custom)

## 3.2 Set Model

Click "Set Model" button, as shown in the following image:

Set Sample	- □ >
ET 2314 0F06ET	Flow of Setting   Color Data     0. Camera Para Set   Y std   Y understand     1. Range of Search   Y std   Y understand     2. Loo Model Set   U std   U understand     3. IC Type Set   V std   V understand     4. IC Direction Set   V std   V understand     5. Lootion para Set   6. IC Direction Check   Stand 61   Curn     7. IC Type recogn para   8. IC Char absent Para   Score   foot dis0     9. Foot1 Set   Uiffer test   Our compare with the sample point of     Make sure Return Main menu   Load Prog   Cancel Set return main menu
Curr Step Step O: Camera para Set   A Test rebuild   Back V Test rebuild   Next Make Sure, Next Camera para 1600 •   Sample Set image state 140 •	

Camera parameter setting, mainly by adjusting exposure time, gain and brightness, to achieve a better image effect, this is the important basis of the whole detection work. The adjusting method changes the imaging effect of the image by increasing the button of sliding bar edit box to change the imaging effect of the image.

Of course, it also includes adjusting the selection of light source, adjusting the direction of lighting, and selecting the color of illumination lamp, aiming at different detection objects. Make reasonable choices; "how to choose a Light Source" is a big topic and a very professional one.

The principle described here is that the light source lighting should be helpful to distinguish the direction of the lack of angle of judgment, and to choose the suitable exposure time for the key content. Because the photo here is similar to shooting a moving object, because if you wait until the workpiece stops and take a picture, then the time is too late to be completed within the time required for the detection. So we usually choose the 600 us or so, of course, if we can adjust the 2000 us for the poor imaging effect such as transparent glass, it really needs the operators to accumulate experience.

The adjustment of exposure time has its advantages and disadvantages. The gain is usually 150, the brightness is usually 3, or 4, so that the image has less interference and stability. Complete the parameter setting [confirm camera parameters into the next step] to set the scope of work, and you will find that the camera parameter setting options in the upper-right corner of the detection process are checked, indicating that this item is complete. Of course, it can also be adjusted according to the need to turn around;

#### 3.3 Camera parameters set

Click "Next" and the interface will show as follow:



In fact, the scope of work, that is, the range of the workpiece that may appear in the lens, so that when the workpiece is detected, the workpiece can be searched and located within that range, thus reducing the time of searching and searching. Reduce the interference of complex background to image recognition.

The default working range is the purple rectangular region with the center of the image as the center and the width of the image as the width and height of the image.

When you need to specify the range of work, depending on the image, click the center of the work piece in the image with a mouse, change the width range and height range to set the range of work, you can use [<] in the screen to the left. [>] to the right, [A] up [V] down, move the button to fine tune the center position, resize the area by increasing and reducing the button, if the center point and width range specified by the mouse,

The range of height is beyond the range of the image, indicating that this setting is not reasonable, then the display purple range box will not appear.



## 3.4 Location Model Set

Click "Next" and the interface will show as follow:

First move the mouse to the center of the display, click on the left mouse button, and then the green positioning box appears around the workpiece, resizing the width and height of the template To the left and [>], to the right through [<] in the screen. [A] up , [V] down, move the button to fine-tune the center position of the template, adjust the size of the green template box by increasing and reducing the button;

Finally, the green location template box is slightly larger than the workpiece, and can completely cover the entire workpiece, which can adjust the threshold value, that is, the image segmentation threshold (as explained by the preceding noun), and the MASK width,

Click on the settings template in the screen to go to the next step, and the image of the opposite template (lower right) will show the result of the setting of the corresponding template.

The best effect should be, The outermost contour of the workpiece is shown in green in the template. If it is not continuous, it needs to reduce the threshold value. If there is an extra contour line or a random disturbance green spot, the threshold value should be increased.

## 3.5 IC Type Set:

Click "Next" and the interface will show as follow:



The yellow rectangle box is used to indicate the area that needs to be checked to distinguish different types of products to prevent mixing problems.

The yellow rectangle should be within the green template.

Move the mouse to the center of the area that needs to be detected, click on the left mouse button, confirm the color detection center, change the width and height of the detection to change the size of the yellow box. You can use the [<] left, [>] right, [A] upward [V] downward, moving buttons to detect the location of the area.

## 3.6 IC direction detection Set

Click "Next" and the interface will show as follow:

Set Sample	
e FT 23 14 FOGET	Flow of Setting     Image of Search     Image of Search
Curr Step Step 3: IC type Check Back Move mouse to the position Hext Set IC type model set Sample Set Curr Step Step 3: IC type Check V Test rebuild New IC type set Type width [92 . Type idth [92 . Sample Set	

The basis for judging the direction of IC: the gray value of the pixels in the circle is considered as a white spot if it is greater than the binarization value set if it is greater than it and if the black spot is considered as a black spot if the value is greater than the set binary value.

When the mode is set to 6, the number of pixels in the region is counted. If the mode is set to 7, it counts white points, that is, the number of pixels in the region.

## 3.7 Set & Test Location parameters:

Set Sample	- □ >
ET 23 14 DF06ET	Flow of Setting   Color Data     V 0. Camera Para Set   Y std   V curr     V 1. Range of Search   V std   V curr     V 2. Loc Model Set   V std   V curr     V 3. IC Type Set   V std   V curr     V 4. IC Direction Set   IC_MARK point numbers     5. Loction para Set   stand   31     Curr   31     Score   foot dis0     Score   foot dis0     Score   loc     9. Foot1 Set   differ test     10. Foot2 Set   differ test     Make sure Return Main   Load Prog   Cancel Set return
Curr Step Step 4: IC dir Set   A Y Test rebuild New   Back Move mouse to the position ICdir Set para II3 +   Next set dir para, please check MARK size 113 +   Mark set dir para, please check mode 7 +	Loc Model

Location similarity 1: meaning is the pass score of primary search in the process of image recognition, that is, if the score of primary search is higher than this value, it is possible to carry out the subsequent advanced search;

Location similarity 2: the meaning is the pass score of advanced search in image recognition process, and only if the pass score is exceeded in advanced search, can it be considered successful to find the sample. Search binarization: the mathematical segmentation threshold of the location feature is confirmed, that is, the contour point of the feature is considered to exist when the change rate of the gray level is greater than this value.

The "test" button, which can test different samples and standard sample recognition scores to determine the appropriate level of permission, the test score, the positioning score on the right screen can be displayed.

## 3.8 Set the parameters for IC direction detection

	= /
ET 23 14 0F06ET	Flow of Setting   Color Data     V   0. Camera Para Set   Y std   0   y our   0     V   1. Range of Searoh   V std   0   V   0   v   0     V   2. Loo Model Set   V std   0   V   0   v   0     V   3. IC Type Set   V std   V v   0   our   0     V   4. IC Direction Set   IC_MARK point numbers   stand   31   Curr   31     Fara   7. IC Type recogn para   Score   0   foot dis0   Score   foot dis0     9. Foot1 Set   0   foot wd   0   foot   0   1     10. Foot2 Set   differ test   ourr compare with foot   0   1   1
Curr Step Step 6: IC dir Para	Make sure Return Main menn Load Prog Loc Model

Parameter description:

MASK similarity: MASK is the feature of the specified directional region, and the similarity is the similarity between the current direction region and the image feature of the set direction region template.

Generally set to 60, if the image effect is not good, not in line with the standard also found, the value will be increased. The opposite is true. The ratio of blackspots (percentage) of MASK: the number of blackspots fixed in the direction as the benchmark (think 100%), the current number of detected blackspots and the percentage of the benchmark example; Generally set to 50, if the image effect is not good, not in line with the standard also found, the value will be increased. The opposite is true.

## 3.9 Set IC Model identification parameters

Set Sample	>
ET 2314 DF06ET	Flow of Setting   Color Data     V 0. Camera Para Set   Y std 0   Y curr     V 1. Range of Search   V std 0   U curr     V 2. Loo Model Set   V std 0   U curr     V 3. IC Type Set   V std 0   V curr     V 4. IC Direction Set   IC MARK point numbers     S. Loction para Set   stand 31   Curr     Para   Score   foot dis0     9. Footl Set   differ test   our ompare with the sample point of
Curr Step step 7: IC type para Back make sure, next Accept1 40 4 Next Search Threshold 50 +	Hake sure Return Main menu Load Frog Cancel Set return main menu A V V

Parameter description:

Similarity 1: meaning is the pass score of primary search in the process of image recognition, that is to say, only when the score of primary search exceeds this value, can we carry out the subsequent advanced search;

Similarity 2: the meaning is the pass score of the advanced search in the image recognition process, and only if the pass score is exceeded in the advanced search, can it be considered successful to find the sample.

Search binarization: the mathematical segmentation threshold of the location feature is confirmed, that is, the contour point of the feature is considered to exist when the change rate of the gray level is greater than this value.

"Test" button, click on the button, the right color data in the right column will display the current YUV color data, you can set the error between the data and sample data parameters

## 3.10 Set IC Model character incomplete parameters

Set Sample	>
Let anno 200	Flow of Setting   Color Data     V 0. Camera Para Set   Y std   v ourr     V 1. Range of Search   U std   v ourr     V 2. Loc Model Set   U std   U our     V 3. IC Type Set   V std   v ourr     V 4. IC Direction Set   IC_MARK point numbers     S. Loc thar absent Para   Score     V 7. IC Type recogn para   Score     V 9. Foot1 Set   differ test     V 10. Foot2 Set   differ test     our compare with the sample point of   0
Curr Step Step 8: IC Char absence Back Next make sure Sample Set A Test rebuild New IC char absence sensilarity free free free free free free free fre	Make sure Return Main menu Load Prog Loe Model

Parameter description:

Incomplete sensitivity: generally set at 20; total area allowed for incomplete:

The minimum area of dirty or defective allowed in image alignment, this parameter can be adjusted to change the sensitivity of detection to meet different detection requirements;

The maximum allowable error of gray level: according to the sensitivity of human eye to black and white grayscale grade, increase the compensation coefficient, make the judgment of computer more close to the sense of human eye;

## 3.11 Set the pin 1 (custom citation)

Set Sample	>
ET 214	Flow of Setting Flow of Setting Color Data Y std 0 Y ourr 0 U std 0 U 0 V std 0 V 0 V std 0 Score 10. Foot1 Set - differ test ourr compare with the sample point of Make sure Return Main main menu
Curr Step 9: footl set Back Mext Set area Special feature threhsold Sample Set Mext Sample Set Curr Step 9: footl set A V Test rebuild New footl para foot vd - foot vd - foot num foot num	Loc Model

Image gray level refers to the brightness of each pixel is represented by 0 to 255 steps, 0 for the darkest, 255 for the brightest.

Gray limit: the image in the selected area sets the lower limit of the grayscale grade and the luminance limit of the pixel in accordance with the requirement; the total area is the sum of the pixel points automatically obtained according to the upper and lower limits of the gray scale in the selected region according to the requirements of bright reading.

If the current sample is set as a standard sample, the current sample area is considered to be 100. Percentage permission: take the set sample as the reference datum, the number of pixels that accord with the luminance requirement namely area, compare with the sample standard, get the percentage of the score; according to the test request, determine that the measured percentage value belongs to the range of the good product.

For example, the allowable area is a little larger than the sample area, then the percentage limit can be set to 125, the allowable area is slightly smaller than the sample area by 20, then the percentage lower limit is set to 80.

## 3.12 Set The pin 2 settings (custom):

Click "Next" and the interface will show as follow. Same as pin 1 setting





#### 3.13 Save settings and Return

Click to "Make sure Return main menu" to confirm the settings and return to the main menu: when the settings are complete or the parameters have been modified successfully, then if the settings are set successfully, the parameters can be saved, or if the settings are not set well, then cancel. Only if 0-11 parameters are set successfully, then confirm the settings are complete and return to the main menu.



## 3.14 Test result interface

After return to the test interface for testing, the product OK/NG is shown in figure:

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	Curr Result      NG list     Image: Construction of the second statistic of the second statist
Select PROG Set Model Another Model Test IO Menual Test Jump Chines/I   Product Type Auto Checking Esc P	English rog
register modie needy	ポーム ポーム語 小英 M 20:26 ポーム 記 小英 M 2018/11/22 ■
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KRD & MSvision MSChecker For IC Ver1.0.0.29     Image: Select Product Type     Product Type     rsdemoZ     Stop manual check     Banual text ting manual text thow pars=1.7	Image: statistic statis statistic statistic statistic statistic statistic s

KRD & MSvision MSChecker For IC Ver1.0.0.29				<u> </u>	×
		Curr R	esult	NG list Absense OK Loc Err OK V Type Err	
				I▼ Dir NO I▼ Char Err OK	
		Absense	Grav 85	▼ Foot Self OK	
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		Color U	Err 0 0	olor V Err 0	
		Dir Simulau	ity 30	PointsNum 24	
		Totle	Área 0	Max area 0	
		-Statist Foot Da	ic/Sample/Last NG ] .ta Statictic Sampl .ta Data Image	mage <sup>e</sup> Last Image	Save
		No	R Std C	Std C Std	
Select Set Model Another	Test IO Manual Test Junn	2G 2G 2G 2G 2G	0K 22 20 0K 22 22 0K 22 20 0K 22 14	6 6 21 6 6 21 6 6 21 6 5 21	
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manual testing manual test show para=4.9		Loc Prog	110 00 DE	× 01	>
			X Y 188 NV 3	× w 2018/11/22	50)

## 4. Program Select

KRD & MSvision MSChecker Fo	r IC Ver1.0.0.29				- 0 ×
	Open     → ↑   (   本地磁盘	e CheckModel v 0 emo.chmdl lemo2323.chmdl lemoz.chmdl lemoZ.chmdl	Curr Resul 搜索*CheckModel* 修改日期 2018/11/22 17:12 2018/11/22 17:22 2018/11/22 17:01 2018/11/22 20:24	t ア 学型 CHMDL: CH	G list ✓ Absense Waiting ✓ Loc Err NO Chec ✓ Type Err Waiting ✓ Dir Waiting ✓ Char Err Waiting ✓ Char Err Waiting ✓ Foot Self Waiting PointsNum Max area * Last Image Save
Select PROG S	File name:	nd] ~	select a model file	> C :	Std C Std 🔺
Product Type xsdemoZ	Aut	to Checking	Ese Prog 2G 2G 2G 2G 2G 2G 2G 2G 2G 2G 2G 2G		
register Pause			Loc Prog	x <sup>e</sup> 🔺 🌄 (10) u	→ <sup>21:00</sup> → M 2018/11/22 <b>→</b>

Program: check the process; Program of checking, which is stored in the D:\ checkmodel directory, according to the user definition of the product model name, by selecting the program file way, select a different product; Once the program is choose, then all the test parameters are called in. If you successfully call in, you can see that the new product model name is displayed in the product model, and the standard inspection sample image or NG image in the lower right corner of the screen shows the sample image of the model product. Check it against it and confirm that it is correct. Then the test can be carried out.

R	Select PROG	Set Model	Another Model	Test IO	Manual Test	Jump	Chines/English
-Product Type-				A	uto Checking	1	Esc Prog
register	Modle	Ready					Loc Prog

Curr Result Ko list V Absens V Loo Er V Type E V Dir	r Waiting Waiting Waiting Yaiting
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xxdemoZ     Auto Cheoking     Eso Prog     26       register     Modle Ready     Eso Prog     26       Construction     Construction     Construction     Construction	>

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Select PROS Set N MODEL 2G   wsdemoZ Auto Checking Esc Prog 2G   register Pause Loc Prog 2G	× 英 M 22:20 英 M 2019(11/22) ■

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register Modle Ready		Loc Prog	G	×

(End of Documents).

Any questions please do not hesitate to contact us:

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