# DRY FILM AUTO CUTTING LAMINATOR



# **Operation Manual**





**Revision 1.00** 

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# Introduction

Thank you for purchasing the Dry-Film Auto-Cutting Laminator unit manufactured by Hakuto Co., Ltd. This manual describes the methods of operation and maintenance for the unit. Read this manual before using the unit, and refer to it as necessary. Please note that this manual is based on the standard specifications, which may differ slightly from those of your unit. If you have any question regarding the specifications of your unit, please contact Hakuto Co., Ltd. or its agent.

This manual consists of

1. Precautions, 2. Operation Panel, 3. Preparation for Operation, 4. Automatic Operation, 5. Manual Operation and 6. Alarm



This manual explains units that move PWBs from left to right.

For units that move PWBs in the opposite direction, read "left" as "right", and "right" as "left".

Be sure to gain a full understanding of the contents of this manual to ensure the optimal performance of the unit.

• The copyright on this manual belongs to Hakuto Co., Ltd.

This manual is provided only to support the Auto-Cutting laminator unit marketed by Hakuto Co., Ltd., and shall not be used for other purposes.

This manual shall not be used or reproduced, in whole or in part, for purposes other than those described above, without the written permission of Hakuto Co., Ltd. Reproduction includes the translation of this manual into other languages or formats, and the rewriting of this manual.

Customers who purchase an Auto-Cutting Laminator unit marketed by Hakuto Co., Ltd. are requested to gain a full understanding of the methods and processes for use of the unit, and to use it at their own risk.



- Before using the unit, customers are requested to provide a suitable environment and prepare rules and restrictions to ensure appropriate actions for the maintenance of safety and health.
- The contents of this manual are subject to change without notice.

# After Sales Service

Before requesting repairs, please read this Instruction Manual again and inspect the system according to the procedures outlined herein. If the error is persists contact your local Hakuto representative or Hakuto. When you request repairs please provide the following items:

- Model number
- Product number and serial number stamped on the nameplate
- Operation condition and environment
- A detailed description of the problem

If the damage is extensive, the user may be requested to send a part or all of the system to Hakuto, in which case it may take a long time to complete repairs.

# Contact Information

If you need information regarding operation, maintenance, or repair of the machine not provided in this manual, please contact your local Hakuto representative or Hakuto as below.

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# Revision History

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Rev.1.00	First revision NEW	July. 2016



# 1. Precautions

This systems uses high voltages for operation and has the parts may become high temperatures..

If it is not handled in a proper way, it may cause a risk.

Please read and fully understand this chapter to use the system in a safe and proper way.



# 1.1. Indication mark

The indication mark shown in this manual is mentioned here.

# 1.1.1. Definitions of WARNING, CAUTION and NOTE

The meaning of the indication mark being written in this manualis as follows.



This mark indicates that there is a danger of serious or minor injury if the user ignores the related instructions in using the system



This mark indicates the danger of damaging the system or auxiliary machines (property damage) if the user ignores the related instructions in using the system.



Indicates an item recommended for the user to understand for safe and comfortable operation of the system.

The above "serious and minor injuries," "property damage," and "user" have the meanings specified below.

Serious	Blindness, injury, burns (high- and low-temperature), electric shock,		
injury	fractures, and toxicosis that accompany after-effects, and injuries that		
	require admission or long-term hospital stays.		
Minor	Injury, burns (high- and low-temperature), and electric shock that do		
injury	not require admission or long-term hospital stays.		
Property	Property Secondary damage to the production line, peripheral devices,		
Damage	amage other auxiliary equipment.		
User	Users of the unit, including the purchaser and those who are		
	requested to operate the unit by the purchaser.		



# **1.2. Notes on Handling**

This section describes notes for using the system in a safe and system way. Before using this system, please read and understand this manual thoroughly.

## **1.2.1. General Precautions**

This section provides general precautions which the user should understand well for using the system.



- Do not open doors unnecessarily during operation.
- Before starting manual operation for maintenance, make sure that nobody is at the back of or inside thesystem and does not touch the system.
- Do not modify the system structure (including cables).
   An electrical shock, fire, or faults may be caused.
- Do not touch the system with wet hand for operation ormaintenance. An electrical shock may be caused.
- Do not generate flammable gas or corrosive gas around the system.

Fire, current leakage, or faults may be caused.

If smokes, abnormal sounds, or abnormal smells are observed on the system, immediately turn off the main breaker and make sure that the abnormal state stops. Then contact Hakuto or your local dealer. If the system continues operation in an abnormal state, fire, an electrical shock, or system damage may be







## 1.2.2. Cutter



The unit has a rotary cutter for cutting films. Be careful when handling it, as its circumference is razor sharp.

Do not touch the circumference when holding the cutter.
Use the specified tools to replace the cutter.
Keep the cover closed even when the unit is not in operation.



Do not drop or apply an impact to the cutter, as it may break.



## 1.2.3. Centering Mechanism



The input conveyor of the unit has a PWB centering mechanism that is driven by an air cylinder.





Do not adjust the centering mechanism so that it is smaller than the width of PWB, as the input conveyor may be damaged.





## **1.2.4. Backup Roll and Laminating Roll**

The lamination module of the unit has the backup rolls and laminating rolls that rotates at high temperatures.

Be careful, as it is hot even when the unit is not in operation.









# 1.3. Warning Labels

This Section explains the definitions and locations of the warning label that is affixed to the unit.

## **1.3.1. Description of Warning Labels**

The warning labels are affixed in several place in the unit to call attention to the user. This section explain the content and the location of each labels.

No.	Type of label	Description	Location
1	A	Caution: Electric Shock	<ul> <li>Blower-fan power supply connection</li> <li>Laminating roll slip ring</li> <li>Control box</li> </ul>
2		Caution: High temperature	<ul> <li>Laminating roll</li> <li>Backup roll</li> <li>Tacking heater cover</li> </ul>
3	<u>Core</u>	Caution: Keep fingers away to prevent them from being caught.	<ul> <li>Laminating roll</li> <li>Input conveyor rail</li> <li>Output conveyor rail</li> <li>Centering plate</li> </ul>

Warning Label Table



No.	Type of label	Description	Location
4		Caution: Keep fingers away to prevent from being caught.	Input conveyor
5		Caution: Keep away from the cutter	<ul> <li>Cutter unit</li> </ul>
6	WARNING 警告      Warning 警告      A subject of the sequence of the sequen	Warning for the danger inside the unit	<ul> <li>Control box</li> <li>*back face breaker side</li> </ul>
7	A 察 者     Do not remove cover while operating.     運転中は必ずカバーをして下さい。	Close the cover	Front door
8	ELECTRICITY CONNECTING POINT Connect earth wire to earth point. 電気接続ロ アース線を必ず接続してください	Power supply connection	<ul> <li>Cover under the back face control box</li> </ul>





No.	Type of label	Description	Location
9	EXHAUST DUCT CONNECTING POINT 排気ダクト接続ロ	Exhaust duct connection	Exhaust duct
10	AIR CONNECTING POINT エアー接続ロ	Air connection	<ul> <li>Primary source connection</li> </ul>
11	CAUTION     注意     Stabbing point.     電極の針先の突き刺しに注意	Caution: Be careful to prevent injury by the electrode.	<ul> <li>Anti static bar</li> </ul>

Warning Label Table (continued)



# 1.3.2. Location of label Front side





## Back side





## Inside the unit





# **1.4. Safety Device**

The unit has safety devices to prevent danger in the event that it is incorrectly operated, and to ensure preparedness for emergencies.



## **1.4.1. Emergency Stop Buttons**

Emergency stop buttons are located on the operation panel, backside door and under the input conveyor. In the event of a problem, press one of the emergency stop buttons. The unit will immediately stop and enter a state identical to pressing the Power off button on the operation panel.







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After correcting the problem, turn the button clockwise to release. Press the Power on button on the operation panel to resume normal operation.



# 3. Preparation for Operation

Before starting automatic operation, follow the steps specified below to install dry film and set the PWB information.



# 3.1. Loading of Dry Film (DF Bulk Unit)

The methods for loading dry film differ for the upper and lower DF bulk unit.

This section explains the methods of loading dry film into the each of the upper and lower DF bulk units.

# 3.1.1. Loading Dry Film into the Upper DF Bulk Unit

1.

Open the front door and press both the input/output conveyor unit into the back.



Load dry film into the upper DF bulk unit with the power switch turned on.

The lamination module contains high-temperature and high-voltage parts, so be careful to prevent burns and electric shock.

#### 2.

Remove the dry film from the crating and packing bag.



If it is exposed to light for and extended period, the dry film with be sensitized.

It is therefore packed in a light-shielded bag for storage.

To avoid exposing it to strong light, remove it from the packing bag and load it into the DF unit in a room with yellow light.







#### 3.

Lift the eco-roll of the upper DF bulk unit, remove the film-roll shaft and position the dry film at approximately the center of the shaft.

When positioning the dry film, align the key of its core with the groove of the retainer.

#### 4.

Place the film-roll shaft loaded with the dry film into the upper DF bulk unit.

Use the axial-adjustment knob to position the dry film so that it is laterally symmetrical when measured from the side plates at the edges of the unit.



Open the hook to remove the eco-roll from the arm of the upper DF bulk unit, and turn the adjustment ring to make a clearance on the external circumference.
● Making a clearance with the adjustment ring expands the diameter of the eco-roll slightly.





- After a roll of dry film is used up, reducing the diameter of the eco-roll by turning the adjustment ring makes the removal of the cover film easier.
- The cover film must be removed every time a roll of dry film is used up. Otherwise, the additional cover film will increase the diameter of the cover film on the eco-roll to a point where it interferes with other compornents, potentially causing a malfunction.

#### 6.

After the eco-roll has been prepared (step 5), replace the eco-roll in the arm, and secure it with the hook.



Pull out the dry film, run it between the roll and the tension roll to separate the laminate film from the cover film.



 Affix a piece of tape to the top and another to the bottom of the film. Pull upward and downward to separate the cover and laminate films.





Fix the cover film to the eco-roll, and pull down the eco-roll so it rests on the dry film.

While separating the laminate film from the cover film, wind the cover film several additional turns.



Avoid using adhesive tape or inserting cover film into the clearance of the eco-roll when fixing the cover film to the eco-roll, as it is harder to remove the cover film.



#### 9.

The dry film has now been loaded into the upper DF bulk unit, along the route shown in the Figure 3-6.



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#### 10.

Run the laminate film along the film-running surface as shown in Figure 3-7.





#### 11.

Run the laminate film down to the film guide and press the "Vacuum" button on the input conveyor unit.

The blower fan will start, activating the tacking plate, cutter backup, and guide for vacuum-pressure operation.



This operation is not required if Loading Dry Film into the Lower DF Bulk Units is done first.





#### 12.

Extend the film along the film-running surface while maintaining its tautness.

• While doing so, center it by referring to the scale on the cutter backup.



#### 13.

Press the "Upper Cutter" button on the operation panel.

• The cutter assembly will run to cut the excess-film section.



Be careful when running the cutter to cut the film with the lamination module pulled out.

• Keep the cutter cover closed even when the cutter is not in operation.



#### 14.

Remove the excess film that has been cut off.

- Loading Dry Film into the Upper DF Bulk Unit is finished.
- Pull back both the input/output conveyor unit to the home position and close the front door, except when also loading the dry film into the lower DF bulk unit.



# 3.1.2. Loading Dry Film into the Lower DF Bulk Unit

#### 1.

Open the front door and press both the input/output conveyor unit into the back.
This step is not required if the dry film is loaded into the lower DF bulk unit immediately after the upper DF bulk unit, as the conveyor unit would already have been pressed into.

#### 2.

Remove the dry film from the crating and packing bag.



If it is exposed to light for and extended period, the dry film with be sensitized. It is therefore packed in a light-shielded bag for storage. To avoid exposing it to strong light, remove it from the packing bag and load it into the DF unit in a room with yellow light.



#### 3.

Lift the eco-roll of the lower DF bulk unit, remove the film-roll shaft and position the dry film at approximately the center of the shaft.

When positioning the dry film, align the key of its core with the groove of the retainer.





4.

Place the film-roll shaft loaded with the dry film into the lower DF bulk unit.

Use the axial-adjustment knob to position the dry film so that it is laterally symmetrical when measured from the side plates at the edges of the unit.



Remove the eco-roll from the lower DF bulk unit and turn the adjustment ring to make a clearance on the external circumference.

 Making a clearance with the adjustment ring expands the diameter of the eco-roll slightly.



- After a roll of dry film is used up, reducing the diameter of the eco-roll by turning the adjustment ring makes the removal of the cover film easier.
- The cover film must be removed every time a roll of dry film is used up. Otherwise, the additional cover film will increase the diameter of the cover film on the eco-roll to a point where it interferes with other comportents, potentially causing a malfunction.



#### 6.

After the eco-roll has been prepared (step 5), replace the eco-roll in the lower DF bulk unit.



Pull out the dry film, run it between the tension roll and the roll to separate the laminate film from the cover film.







Fix the cover film to the eco-roll by running it under the dry film, and transfer the ecoroll from the holding groove to the guide section so it rests on the dry film. While separating the laminate film from the cover film, wind the cover film several additional turns.



Avoid using adhesive tape or inserting cover film into the clearance of the eco-roll when fixing the cover film to the eco-roll, as it is harder to remove the cover film.



9.

The dry film has now been loaded into the lower DF bulk unit, along the route shown in the Figure 3-17.





#### 10.

Run the laminate film along the film-running surface as shown in the Figure 3-18.





#### 11.

Run the laminate film down to the film guide and press the "Vacuum" button on the input conveyor unit.

The blower fan will start, activating the tacking plate, cutter backup, and guide for vacuum-pressure operation.



This operation is not required if Loading Dry Film into the Upper DF Bulk Units is done first.





#### 12.

Extend the film along the film-running surface while maintaining its tautness.

• While doing so, center it by referring to the scale on the cutter backup.



#### 13.

Press the "Lower Cutter" button on the operation panel.

• The cutter assembly will run to cut the excess-film section.



 Be careful when running the cutter to cut the film with the lamination module pulled out.

• Keep the cutter cover closed even when the cutter is not in operation.




14.

Remove the excess film that has been cut off.

- Loading Dry Film into the Lower DF Bulk Unit is finished.
- Pull back both the input/output conveyor unit to the home position and close the front door.



# 3.2. Adjustment of the Centering Width

To align the PWB at the center of the input conveyor, use the front and rear centering plates.

 Use the centering adjustment handle to adjust the width of the centering plates to match the width of the PWB.



1.

Place a PWB between the centering plates on the input conveyor.

### MAIN LL SPEED HOME 150 (cm/mir MANH HOME 110 107 AUTO READY 110 THICK PWB 91 89 VACUUM TENSION ON NB COUNT RESET(2sec) PWB MAX TEMP.(U) (℃) FILM WIDT 25"(630) 324 91 PARAMETER MANU. SYSTEM ALARM Figure 3-24

### 2.

Push the yellow "MAN." button on the MAIN screen's "AUTO / MAN." area.

 The unit will enter the "Manual operation" mode to allow operation on the MANUAL screen.







### ROLL HEATER IN CONV. Device Light TACK HEATER ROLL ON ON **OFF** FWD. PINCH ROLL ACK/FOR CENT. (F) CENT. (R) OUT CONV FILM TENSION ΟN ON 0FF **OFF** 0FF REV. TACK BLOCK OWER ▼ ▶⊨ X ▼ X HOME (Press 2s) POSITION Own Weight MANU MAIN Figure 3-26



### 3.

Push the white "MAN." button at the bottom of the MAIN screen.

• The MANU. screen will be displayed.

### 4.

Push the "CENT. (F) OFF" and "CENT. (R) OFF" buttons to activate centering plates Front and Rear.

Adjust the centering width to the width of PWB.

When pressed, the "CENT. (F) OFF" and "CENT. (R) OFF" buttons turn ON, indicating that the centering plates Front and Rear have been activated.

### 5.

Turn the centering adjustment handle marked the red sphere to set the distance between the centering plates to a value slightly greater than the width of PWB.





There are subtle differences in width between different PWB products.

If the centering width is not set a little bit wider than the PWB width, the centering plates will catch those of large widths and damage the PWBs and the centering mechanism.

6.

To stop the centering motion of the centering plates Front and Rear , push the "CENT. (F) ON" and "CENT. (R) ON" buttons.

When pushed, the "CENT. (F) ON" and "CENT. (R) ON" buttons will turn OFF, returning the centering plates Front and Rear to the home position.



# **3.3. Setting of Parameters**

Set the speeds of the conveyors and laminating rolls, the temperature and alarm values of the laminating rolls, tacking blocks, and film guides, leading and trailing spaces for film, tacking time, and film width on the PARAMETER screen.

Push the "PARAMETER." button on the MAIN screen to switch to the PARAMETER screen.

### 3.3.1. Setting Speed

Set the speeds (cm/min) of the input conveyor, output conveyor, and laminating rolls.

2ST. Enable		PARA	METER	D PA	RAMETER MANAGER
SPEED(cm/	min)		F	ILM WIDT	TH inch./(mm)
IN CONV.	130			13"	16"
ROLL	150	SET PA	1RA.	(330)	(400)
OUT CONV	130			20"	25"
TEMP.(°C)	SET I	ALARM ACT	UAL	(500)	(630)
BACKUP ROLL	Automat	ic 140	135 0	LL PRESS	
LAMINATE ROLL	110 ±	30 110	107 SE		. 30 Mpa
TACK	50 ±	20 50	52		
FILM SPACE	(mm) TRAIL	TACK 1	(sec)	THICK PWB	VACUUM TENSION
3. (	3.	0	1.5 se	T PARA.	MAIN
				Fig	ure 3-2

PARAMETER PEED(cm/min) in: 0 ax: 100 IN CONV 130 SET END 150 UT CONS ▶ CLR CANCEL ◀ TARGET CONV. VALUE MANU. 7 8 9 BS n/min) ROLL 150 FINE ADJ. IN CONV 4 5 6 DEL ▼ ON FINE ADJ. CONV. 2 3 + EN FWD. FINE ADJ./ROLL Û 0 N Figure 3-29 1.

Push the SET PARA.

• Goes the speed setting screen.

### 2.

Select the IN CONV., ROLL or OUT CONV. by pushing the frame on the screen and change the speed by the numeric keypad on the right side.

 Input the numbers by the numeric keypad and push the ENT.

After changing all of the speed, push the SET END to go back to the PARAMETER screen.



## 3.3.2. Temperature Setting

Follow the steps specified below to set the alarm values and the temperature (°C) of the tacking and laminating rolls.

2ST. ENABLE		PARAMETER	PAJ	Xameter Manager
SPEED(cm/r	nin)		FILM WIDT	H inch./(mm)
IN CONV. ROLL	130	set para.	13" (330)	16" (400)
TEMP.(°C)	SET ALARM	ACTUAL U I	20" (500)	25" (630)
BACKUP ROLL LAMINATE	Automatic	140 135	ROLL PRESS	30 Maa
ROLL TACK	$110 \pm 50$ 50 ± 20	50 52		
FILM SPACE	(mm) TRAILING	TACK TIME	THICK PWB	VACUUM TENSION
3. 0	3. 0	0 1.5	SET PARA.	MAIN
			Fig	ure 3-30

SPEED(om/	min)							
IN CONV.	130			Min: Max:	0 100			
ROLL	150		SET PARA.					0
OUT CONV	. 130 Set	ALARM	ACTUAL		►	CLR	CAN	ICEL
BACKUP	Automa	atic	40 135	7	8	9	BS	
LAMINATE	110 ±	30	110 107	4	5	6	DEL	▼
ТАСК	5() ±	20	50 52	1	2	3	+	C
FILM SPACE LEADING	<mark>(mm)</mark> TRA	ILING	TACK TIME (sec)		0 4		-	N T
3. (		3. 0	0 1.5				SET	END
				- 19	F	iau	ro '	2_1



1.

Push the "SET PARA." button.

• Goes to the temperature setting screen.

### 2.

Select the LAMINATE ROLL or TACK by pushing the frame on the screen and change the temperature by the numeric keypad on the right side.

 Input the numbers by the numeric keypad and push the ENT.

After changing all of the temperature, push the "SET END" button to go back to the PARAMETER screen.

The allowable r	na	iximum	temperature	to be set is:
Laminating roll	:	130°C		
Tack	:	60°C		



## 3.3.3. Setting of the Leading and Trailing Film Spaces



Follow the steps specified below to set the spaces on the leading and trailing edge of the board where the film will not be laminated onto the PWB (length in mm.)

### PARAMETER MANAGER 2ST ENABLE PARAMETER SPEED(cm/min) IN CONV. 130 13" (330) 16" SET PARA ROLL 150 (400) OUT CONV. 130 20" (500) 25" (630) ACTUAL ALARM BACKUP ROLL 140 135 Automatic 0.30 LAMINATE ROLL 110 ± 30 110 107 ТАСК 50 ± 20 50 52 ILM SPACE(mm) THICK PWB VACUUM TENSION 3.0 🖸 3.0 • 1.5 SET PARA. MAIN Figure 3-33

### PARAMETER SPEED(cm/min IN CONV. 130 Min: 0 Max: 100 SET PARA. ROLL 150 OUT CONV. 130 ► CLR CANCEL ◀ ACTUAL EMP. (°C) ALARM 8 9 BS BACKUP ROLI Automatic 140 135 LAMINATE 110 ± 30 110 107 5 6 DEL 4 ▼ ТАСК 50 ± 20 50 52 1 2 3 + CK TIME (sec) ILM SPACE(mm) 0 3. 0 🖸 3. 0 $\bigcirc$ SET END Figure 3-34

### 1.

Push the "SET PARA." button.

• Goes to the film space setting screen.

### 2.

Select the LEADING or TRAILING by pushing the frame on the screen and change the film space by the numeric keypad on the right side.

 Input the numbers by the numeric key and press the ENT.

After changing the space, push the "SET END" button to go back to the PARAMETER screen.





Since film placement is +/-0.5 mm, caution should be used when operating with a film space value of 0.5 mm or less.

### 3.3.4. Setting of Tacking Time

Follow the steps specified below to set the time (in sec) for tacking the dry film at the PWB front edge the tacking plate.



### PARAMETER SPEED(cm/min) IN CONV. 130 Min: 0 Max: 100 SET PARA ROLL 150 OUT CONV. 130 ► CLR CANCEL ◀ EMP.(°C) ACTUAL BACKUP 8 9 BS 7 Automatic 140 135 LAMINATE 110 ± 30 110 107 5 6 DEL 4 ▼ ТАСК 50 ± 20 52 50 1 2 3 + E N T ILM SPACE(mm) 0 3. 0 🖸 3. 0 SET END Figure 3-36

NOTE

1.

Push the "SET PARA." button.

• Goes to the tacking time setting screen.

### 2.

Select the TACK TIME by prushing the frame on the screen and change the tacking time by the numeric keypad on the right side.

Input the numbers by the numeric key and press the ENT key.

After changing the tack time, push the "SET END" button to go back to the PARAMETER screen.

The maximum allowable tacking time that can be



set is 99.9 sec.

## 3.3.5. Setting of Film Width



Set the film width on the PARAMETER screen.

Select one of the four film widths that corresponds to the width of the loaded film. The selected buttun is turned green.



When the film width is set, the vacuum-effective width of the tacking plate is automatically adjusted. If an incorrect film width is set, proper vacuum pressure will not be obtained.

Therefore, be sure to correctly set the width of the dry film to be used. If the correct value is not available, choose the next smaller film width.



## 3.3.6. Setting of Thick-PWB Mode and Vacuum Tension



NOTE

### What is "Thick PWB"?

When "Thick PWB" mode is ON, the laminating roll does down at the front edge of the panel, then stop pressuring at the trailing edge of the panel.

### What is "Vacuum tension"?

If the VACUUM TENSION button is turned "ON," the film tension will be increased during lamination by increasing the vacuum pressure of the tacking plate, cutter backup, and film guide. Select the film tension in accordance with the specifications of your products and dry film.



Can ON/OFF the Thick PWB and vaccuum tension mode on the Parameter screen. The buttun is turned green when it is ON.



# 3.4. Setting of System Data

The remaining film counter, PWB count, cut count, and calendar data are set on the system screen.

Push the "SYSTEM" button on the MAIN screen to go to the SYSTEM screen.

## 3.4.1. Setting of the REST FILM (Remaining Film) Counter

Input the actual value of remaining film and the desired alarm value when dry film is loaded.



Select the ACTUAL or ALARM by pushing the frame on the SYSTEM screen and change the value by the numeric keypad on the right side.

• Input the numbers by the numeric key and push the "ENT" key.



The ALARM value should be bigger than 0.0. (>5.0 is recomended) If the ALARM value is set at 0.0, alarms are not issued.



## 3.4.2. Setting of the PWB Count

Display/reset the "ACTUAL" values of PWB count and cut count (number of films cut by the cutter), and input the "ALARM" value.



Select the ACTUAL or ALARM by pushing the frame on the SYSTEM screen and change the value by the numeric keypad on the right side.

Input the numbers by the numeric key and press the "ENT" key.

Hold down the "RESET" button for two seconds or longer.

The ACTUAL value will be reset to "0."



These numbers can be used to to get a rough idea of the period for the cleaning of cutter/rolls and the replacement of the cutter.



# 3.5. Home position

**NOTE** 

Before starting automatic-operation, confirm that each section of the unit has been returned to its home position.

Use the MANU. screen to return each section to its home position if necessary.





### 1.

Push the "HOME POSITION" buttun on the MAIN or MANU. screen.

• Goes to the HOME POSITION screen.

### HOME POSITION HOME POSITION FOR UNIT CUTTER UNIT ROLL UNIT NAIN MAIN Figure 3-43

### 2.

Confirm the unit status on the HOME POSITION screen.

The section of the unit is turned green when it is at its home position.

The section of the unit is turned red when it is not at its home position.

Can go to the detail setting screen by pressing each section buttun.

Turn all to green by adjusting on the manual operation mode.



# 3.6. Heating the Laminating Roll

To heat the laminating roll, the backup roll must be rotating and sit on the laminating roll under its own weight.

Follow the steps specified below to heat the laminating roll.

### 1.

Press the "Power ON" button on the operation panel to start the unit. The MAIN screen will be displayed on the touch panel.





### 2.

Push the "MANU." buttun.

The unit enters the manual operation mode.

### 3.

Push the "MANU." buttun on the bottom of the MAIN screen.

• Goes to the MANU. screen.







### 4.

Turn ON the tacking heater and roll heaterby pushing "TACK HEATER" and "ROLL HEATER" buttun.

• The heaters are turned ON.

And the temperature goes up to the setting value set on the PARAMETER screen.

5.

Push the "ROLL FWD." buttun.

• The laminating roll starts rotating.



If the heater is heated for long without rotating the laminaing roll, the part of laminating roll is heated too much and may melt.

When the roll heater is ON, the laminating roll must be rotated and be down.

The alarm "45 ROLL NOT ROTATING" is occured, if the roll heater is ON for a certain period without rotating the laminating roll.







### 6.

Push the "Down" buttun of the ROLL UP/DOWN.

A roll descends and it will be in pressurization condition.

- "ROLL UP/DOWN" is changed to "ROLL PRESS."
- Push the "Down" buttun of "ROLL PRESS." for 2 sec unit! the sign "Own Weight" is shown on the bottom of the screen.



### 7.

Push "Down" buttun of "ROLL WEIGHT" for 2 sec.

• Confirm the sign "ROLL WEIGHT" on the bottom of the screen.





The alarm is occured when the laminating roll is not down with the heater is ON. When the roll heater is ON, the laminating roll must be rotated and be down. The alarm "45 ROLL NOT ROTATING" is occured, if the roll heater is ON for a certain period without rotating the laminating roll.

The Preparation for Operation is finished now.

The operation can be started if the "READY" lamp is turned on.



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# 4. Automatic Operation

Follow the steps specified below to start Automatic Operation.



## 4.1. Procedure for Starting Automatic Operation

Before starting automatic operation, confirm that daily inspection and preparation for operation have been completed.

To start automatic operation, follow the steps specified below.

### 1. Daily inspection

Confirm that the unit is connected properly to a power source (200V AC), a compressed-air supply system (0.5Mpa), and the exhaust duc and that all modules are normal. The lamination unit, input/output conveyor unit must be at its home position.



### 2. Power ON

Press the Power ON switch on the operation panel to start the unit. The main screen will be displayed on the touch panel after the tack block and pinch roll are back to its home position.



### 3. Check the Cutter Home Position

The Cutter buttun is blinking. To make the cutter be at the home position, keep pressing the Cutter buttun until the cutter stops. In the case the cutter cannot move to the home position, move the cutter under the positioning sensor by the hand and press the Cutter buttun again until the cutter stops at the home position.



**4. Parameter setting** Set parameters on the parameter screen.

# Л

5. System-data setting Set system data on the system screen.

6. "MANU." buttun Enter the manual operation mode once by pressing "MANU." buttun on the center of the Main screen.

### 7. "MANU." buttun

Goes to the MANU. screen by pressing the "MANU." buttun on the bottom of the Main screen.

## \_\_\_\_\_

8. Turn ON the heaters

Turn ON the Tacking heater and Roll heater , then rotate the laminating roll be pressing the "FWD." buttun.

- The heaters start heating up by this operation.
- \* The upper laminating roll starts rotating when it is down.



### 9. Sit the laminating roll by its own weight

Press the Down buttun of "ROLL UP/DOWN to make the laminating roll pressed. Then press the Down buttun again for 2 sec to make the laminating roll sit by its own weight.

# $\int$

### 10. Adjustment of the centering width

Press the "CENT.(F)" and "CENT.(R)" buttun.

Then put the PWB on the input conveyor and use the centering adjustment handle to adjust the centering width.

# $\int$

### 11. Input /Output conveyor

Press the input/output conveyor unit to the back.

# $\frac{1}{1}$

### **12.** Positioning of dry film and the DF unit Place the DF unit loaded with dry film onto the lamination module. Run the laminate film along the film-running surface, and use the cutt to cut off the excess.

•The DF bulk unit may be installed depending on the specifications the unit used.



**13. Input/Output conveyor** Pull back the input/output conveyor unit to the home position.

14. Home-position check

Confirm that the "HOME POSITION" lamp on the main screen lights up. If it is not lit, return to the manual screen and move each unit to ithome position.



**15. "AUTO" buttun** Enter the automatic operation mode by pressing the "AUTO" buttun on the center of the Main screen.

### 16. "READY" lamp lights

When the heaters have warmed up and the unit is ready for automatic operation, the "READY" lamp will light up.

### 17. OPERATION "ON" button

The unit starts automatic operation and laminates the film automaticall when a PWB enters the input conveyor.



# 4.2. Procedures for Stopping Automatic Operation

To stop automatic operation, follow the steps specified below.





**5. Turn OFF the heaters** Turn off the tack heater and roll heater.

6. Input/Output conveyor Press the input/output conveyor unit to the back.

**7. Turn OFF the vacuum** Press the vacuum "ON" button on the operation panel to stop vacuum-pressure. The Vacuum "ON" lamp will go off.

### 8. Rewinding dry film

Manually turn the film rolls of the upper and lower DF units\* to rewind the dry film resting on the film-running surface.

\* The DF bulk unit may be installed depending on the specifications the unit used.







**13. Main breaker OFF** Turn "OFF" the main breaker on the control box at the rear of the unit.



This completes the procedures for stopping automatic operation.



# 5. Manual Operation

If automatic operation has been stopped to load dry film, inspect the unit, or for other reasons, follow the steps specified below to return each part to its home position using manual operation.



# 5.1. Procedures for Manual Operation

If the unit is to be operated manually, it must be set in the "Manual operation" mode.

HOME	No. 13 Hakuto	ROLL SPEED	
	AUTO	MANU.	TEMP. ROLL (°C)
READY	AUTO	BANU.	110 107 SET 110
	OPER/	TION	WB TEMP. (°C) U L
VACUUM TENSION	ON	OFF	91 89 PWB COUNT
FILM WIDTH 25"(630)	PWB MAX TE	MP.(U) (℃) 91	324
PARAMETER	MANU.	SYSTEM	ALARM
			Figure 5-1

ΝΟΤΕ

push the "MANU." button on the center of the MAIN screen.

 Operation mode is change to the "manual operation" mode, allows operation of the MANUAL screen.

- Unless it is a manual mode, don't accept operation in a manual screen.
  - The following hardware buttun can be operated if the unit is not in the manual mode.

Cutter RUN Blower



## 5.1.1. Setup control

The vacuum buttun and cutter run buttun are located on the input conveyor unit to load film onto the lamination module.



### 1. Vacuum buttun

Starts the blower fan and vacuum operation of the tack plate, cutter backup and film guide on the system.



### 2.Upper Cutter run buttun

Runs the upper cutter unit only while the button is pressed and held.

### 3. Lower Cutter run buttun

Runs the lower cutter unit only while the button is pressed and held.

 Be careful when running the cutter to cut the film with the lamination module pulled out.

Keep the cutter cover closed (even when the cutter is not in operation).



CAUTION



# 5.2. Control by Manual Operation

### **①. TACK HEATER**

Turns "ON"/"OFF" the tacking heater built into the tacking rubber at the tip of the upper and lower tacking plates.

### **②. ROLL HEATER**

Turns "ON"/"OFF" the roll heater built into the upper and lower backup rolls.

### 3. IN CONV.

Runs the input conveyor.



### ④. CENT. (F)

Activates the input-conveyor centering plate (F) to perform centering.

### ⑤. CENT. (R)

Activates the input-conveyor centering plate (R) to perform centering.



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Do not set the centering width smaller than the width of PWB, or the input conveyor will be damaged.



### **(6). FILM TENSION**

Activates the upper and lower tension rolls.



The tension rolls are "ON" only while the film tension "OFF" button is pressed and held.



### **⑦.** PINCH ROLL BACK/FORW.

Moves the pinch roll forward when turned "ON" and backward when turned "OFF."



### (8). OUT CONV.

Runs the output conveyor.

### ROLL

Runs the lower backup roll.

Close the laminating roll (Pressured/Own weight), the rolls performs the following operation.

### FWD. buttun

Runs the backup rolls and laminating rolls in the forward direction (from the input side to the output side.)

### REV. buttun

Runs the backup rolls and laminating rolls in the reverse direction (from the output side to the input side.)



Do not touch the rolls even when they are not in operation. Be careful, particularly when cleaning the laminating rolls, as your fingers may be caught and / or burned.



Do not insert foreign articles or the laminating rolls will break or become damaged.



As the backward operation of rolls is abnormal, the roll backward drive button turns "ON" to rotate rolls only while the roll backward "OFF" button is pressed and held.



### 1. LOCK PIN

Locks or releases the tacking block. The tacking block will not move to the open position if it is locked.



### 1. LOCK PIN "RELEASE" button

Releases the lock pin to activate the tacking block.

### **2**. LOCK PIN "LOCK" button

Fixes the lock pin to immobilize the tacking block.

### (1). ROLL UP/DOWN

Raises and lowers the upper backup roll and upper laminating roll in the vertical direction. During lamination, the upper roll moves and the lower roll remains fixed.



**1**. **ROLL UP/DOWN "RAISE" button** Raises the upper backup roll.

ROLL UP/DOWN "LOWER" button

Lowers the upper backup roll.



### 12. TACK BLOCK

Moves the tacking blocks to the closed and opened positions.



### 1. TACK BLOCK "OPEN" button

Moves the tacking blocks to the opened position.

### ②. TACK BLOCK "CLOSE" button

Moves the tacking blocks to the closed position.

### **13. TACK PLATE UPPER**

Moves the upper tacking plate to the closed and opened positions.



**①**. **TACK PLATE UPPER "OPEN" button** Moves the upper tacking plate to the opened position.

2. TACK PLATE UPPER "CLOSE" button Moves the upper tacking plate to the closed position.

### (). TACK PLATE LOWER

Moves the lower tacking plate to the closed and opened positions.

### 1. TACK PLATE LOWER "CLOSE" button

Moves the lower tacking plate to the closed position.

### **2.** TACK PLATE LOWER "OPEN" button

Moves the lower tacking plate to the opened position.



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### **(b). DEVICE LIGHT**

Turn ON/OFF the lighting inside the unit.



# 6. Troubleshooting

This chapter explains typical problems that occur during nomal operation and the actions to be taken in response to them.

Follow the instructions given in this chapter to return the unit to normal operation.  $_{\circ}$ 


# 6.1. Alarm Out and Action

When the unit has failed, it stops and informs the operator of the problem by sounding a buzzer, turning the signal tower RED, and by displaying an error message on the screen.

This ensures safety by warning operators and also provides an explanation of the problem.



If the unit emits odor, smoke, or fire, DO NOT TOUCH THE UNIT!

Immediately turn the main breaker OFF and contact Hakuto or its official agent.

# 6.1.1. Signal - Tower Status and Lighting Condition.



#### **Red lights**

A failure has occurred in the system. Take necessary actions immediately in accordance with the display on the alarm screen.

### Yellow lights

The unit is in the manual operation.

#### **Grren lights**

The unit is in the automatic operation.

#### **Green flashing**

The unit is preparing for the automatic operation.

Although the operation "ON" button is pressed in the automatic mode, some operating parameter like the temperature of the roll heater does not reach the setting value.

Once the all parameters reach the setting value, changed to Green lights.



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## 6.1.2. Operation on the Alarm Screen

When a failure occurs in the system, the alarm screen will be displayed on the touch panel.

Follow the steps specified below to take the required actions.



#### 1.

Display the **number**, the **alarm comment**, the **date** and the **time** when alarm is occurred.

Even in the case that the plural alarm occurred simultaneously all are displayed. Press the Buzzer stop button on the screen to stop the buzzer.

			ALARM	16/05/30	1 (Mon) 14:19
DATA	TIME	NO.	COMME	INT	
16/04/05 16/04/05	05:23 05:22	03 PRIMARY A	ATR PRESSURE		
10/04/03	00.20	IQ INILOKL.			
			enter		
BUZZE					
STOP		RESET		ALARM LOG	MAIN
				Ei	aure 6
					guie c

# 2.

Press the alarm display on the screen.

The alarm is selected and boxed the while frame.



#### 3.

In the case that the plural alarm occurred, use " $\blacktriangle$ ", " $\blacktriangledown$ " button for selecting one.







## 4.

Press the "ENTER" button after selecting the alarm.

 The workaround for the selected alarm is displayed.

## 5.

The workaround can be cleared by pressing the  $\lceil X \rfloor$  button on the right top corner of the workaround display.



## 6.

Press the "Reset" button to reset the alarm after coping the alarm.

 The alarm comment is cleared once the "Reset" button is pressed. The alarm must be reseted after coping that.



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## Reference of the alarm log generated before



To display the log of past alarms, press the "ALARM LOG" button.

 The ALARM LOG screen will be displayed.



In the case to displays the alarm log that is not displayed in the screen, after push alarm inside frame and did the alarm log the highlight then use the "▲", "▼" button.



The workaround of the past alarm can be dispalyed on the alarm log screen. Select the alarm and press the "ENTER" button just like do on the alarm screen.



# 6.2. Alarm comments and Actions

When the unit has failed, the alarm screen appears on the touch panel displaying the alarm comment.

To correct the problem, follow the instructions given on the screen.



# 6.2.1. System Reaction

There are 4 types, A~D, of system reactions show below.

#### Stop pattern table

Reactions		
A	Power OFF	OFF Turn the power switch (main breaker) off. The unit will enter the same state as when the power OFF button or the emergency stop button on the operation panel is pressed.
В	Operation stop	Automatic operation will stop even when a PWB is being processed.



Stop pattern table (Continued)

Reactions		
	Operation-cycle stop	The automatic-operation cycle will stop upon completion of
С		the current PWB processing, in the same manner as when
		the automatic-operation "OFF" button is prossed.
	Operation	Automatic operation will continue, and the operator will be
D	continuation	informed of the failure by the system.

# 6.2.2. Alarm Comments List

Please refer to the attached alarm comments list.

