SMT Printing Solution

ES-E and H

Economic & Smart Printer	Back-to-Back printer High speed printer	Professional Large Printer	Auto Stencil Changeover Printer
• ES-E2 • ES-E2+ • ES-E7	• ES-H1 • ES-H2	• ES-E8 • US-LX	• ES-FA1

Economic & Smart and Flexible Printer
E2. E2+. E7

The model E2 from US-2000X & 2000XQ is designed for a high performance of quality and a scaled-up capacity

ESE best cost-effective model with much more enhanced standard features integrated

Much stable solid frame & Table structure for a cost-saving and 3 stages conveyor system for high throughput

The model E7 from US-7000X is designed for a flexible printing capacity of PCB 700mm by 610mm
based on E2's stable printing repeatability

With enhanced standard features integrated on E2, standard 3 stages conveyor system for high throughput

	ES-E2 and E2+	ES-E7
PCB size	50mm x 50mm - 550mm x 510mm	70mm x 70mm - 700mm x 610mm
PCB Thickness	0.3mm to 6mm	0.3mm to 6mm
Stencil size	550mm, 584mm, 650mm, 736mm	650mm, 736mm, 800mm, 850mm, 900mm
Cycle time	10sec / under optimized condition	12sec / under optimized condition
Alignment accuracy	±12.5 um @ 6 sigma	±12.5 um @ 6 sigma
Printing repeatability	±25 um @ 6 sigma , Cpk ≥2.0 E2+ : ±20 um @ 6 sigma , Cpk ≥2.0	±25 um @ 6 sigma , Cpk ≥2.0

Back-to-Back and High- speed Printer H1 and H2

H1. H2

H1 Ultimate cycle time [core 5sec] and Qualified printing quality & repeatability printer [20um@6sigma] for single or back-to-back configurable printer

Much high productivity for single products – Top & Bottom printing together on each lane

Linear motor applied for stable & fast camera and 3 stages conveyor system as standard

H2 realizes super cycle time based on ESE own technology [core cycle time – 5.5~6 sec and including cleaning – 10sec under ESE optimized condition]

The most stable mechanical structure and printing performance with machine alignment 10microns and repeatability 20microncs will make you cut down sharply your production time and much higher productivity

Linear motor applied for stable & fast camera and 3 stages conveyor system as standard

	ES-H1	**ES-H2**
PCB size	50mm x 50mm - 350mm x 250mm [* Optional 380mm x 280mm]	50mm x 50mm - 550mm x 400mm
PCB Thickness	0.3mm to 6mm	0.3mm to 6mm
Stencil size	550mm, 584mm (23"), 650mm	550mm, 584mm (23"), 650mm, 736mm(29")
Core Cycle time	5sec / under optimized condition	6sec / under optimized condition
Alignment accuracy	±12.5 um @ 6 sigma	±10 um @ 6 sigma
Printing repeatability	±25 um @ 6 sigma , Cpk ≥2.0	±20 um @ 6 sigma , Cpk ≥2.0

Professional Large Printer
E8. US-LX

E8. LX

The automatic stencil printing system E8 based on Standard E2 & E7 platform was developed to cover LED, LCD and much larger substrate up to 850mm.

As a qualified professional large printer by a leading LED, LCD customers, E8 includes all standard E2 & E7 printer features & function and most flexible system in this industry field.

Up to 10kgs* substrate weight on E8 can be handled and flexible design allows customer mask stencil size loading including ESE standard configuration (Optional)

Including Standard clamping system, special designed side vacuum clamp tool kit supports much perfect board clamping and printing result from a warpage

All LX printer - an effective X direction printing & cleaning applied

	ES-E8	US-LX1	US-LX3	US-LX5
PCB size	70mm x 70mm - 850mm x 610mm	100mm x 80mm - 1000mm x 650mm	100mm x 80mm - 1300mm x 650mm	100mm x 80mm - 1500mm x 650mm
PCB Thickness	0.3mm to 6mm	0.3mm to 6mm	0.3mm to 6mm	0.3mm to 6mm
Stencil size	736mm(29"), 800mm, 850mm, 980mm, 1050mm x 850mm	736mm(29"), 980mm, 1300mm x 800mm	736mm(29"), 980mm, 1500mm x 800mm	736mm(29"), 980mm, 1800mm x 800mm
Cycle time	17sec	35sec / 1000mm PCB	40sec / 1000mm PCB	45sec / 1000mm PCB
Alignment accuracy	±12.5 um @ 6 sigma	±12.5 um @ 3 sigma	±12.5 um @ 3 sigma	±12.5 um @ 3 sigma
Printing repeatability	±25 um @ 6 sigma	±25 um @ 3 sigma , Cpk ≥1.33	±25 um @ 3 sigma , Cpk ≥1.33	±25 um @ 3 sigma , Cpk ≥1.33

Automatic Stencil Changeover Printer
FA1

FA1 s made with ESE strong R&D and the fruit of ESE's passion integrated a state of the art and advanced technology

As the leading for industry 4.0, it has been upgraded from US-2000FA and XF which had been developed by a closed cooperation between Samsung Electronics & ESE in 2012.

FA1 is the unique functional printer and should facilitate Mask stencil automatic change, fully integrated PCB support tools and a perfect cleaning system
Auto solder paste dispenser, traceable ESE standard format of MES, SPI closed loop, software managed by barcode etc the built in various and innovated options included.

The active and advanced intelligent FA1 can realize your production line of becoming much more Smart line based on two way communication between manager and production line and it will guide much high productivity,

Maximize managing efficiency and help you to implement a real Industry 4.0 and Smart factory.

And also FA1 can be configured as Back-to-Back for much higher productivity

PCB size	50mm x 50mm - 350mm x 250mm
PCB Thickness	0.3mm to 6mm
Stencil size	584mm (23") or 736mm (29")
Cycle time	12sec (* Stencil Changeover – within 2min)
Alignment accuracy	±12.5 um @ 6sigma
Printing repeatability	±25 um @ 6 sigma , Cpk ≥2.0

Stencil Auto changeover

Standard structure and Feature

Most Stable & Perfect Table

High precise 4 Ball screws with additional 3 shafts

Servo Control Table axis for X, Y and Theta and also Z1 & Z2

Most stable & perfect structure to break up the printing pressure equally and to get a high printing quality
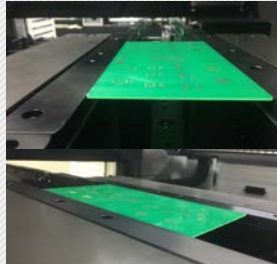
Perfect Clamping

Z (Top) clamp by precise ball screw driven guides a stable PCB loading and much perfect PCB clamping

Center vacuum unit is for individual support plate (JIG) for very thin (less than 0.5mm or 0.3mm) PCB and whenever Users can put a vacuum nest onto the table
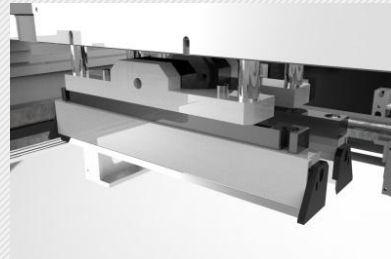
Auto calibration Squeegee

Cylinder and Motor driven printing head makes an uniform printing result.

Depends on substrate condition and solder paste, standard squeegee or Easy clip squeegee can be applied.

Squeegee Z center position auto calibration equipped with software
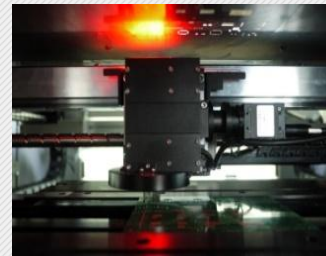
Auto calibration Camera

Camera X and Y axis driven & controlled by ball screw and Servo

Camera recognizes a mark on PCB and Stencil at a time

Field of View 11mm x 8mm

The smallest Mark size is 0.1mm
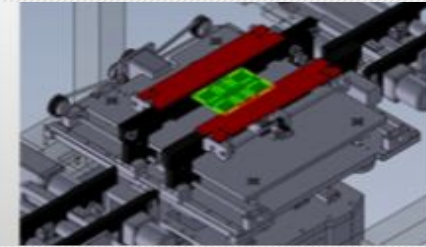
3 stage conveyor

For high throughput, standard 3 stages conveyor system

Automatic Width adjustment system

Standard Wet. Dry. Vacuum cleaning

Standard Dual vacuum. Wet. Dry cleaning system
 No clog solvent nozzle and even solvent spray

Cleaning speed and Cleaning mode (direction, repeat, group etc) can be programmable

Standard Enhanced Program

* 2D inspection for solder excess, less, short and position error

* SPI closed loop with Kohyong, Parmi, TRI, Pemtron, Cyberoptics

* Production programming by network

* Auto stencil loading & positioning

* Auto camera calibration

* Auto Alignment before production (Easy Align)

* Auto stencil inspection & cleaning for a containment area

* Auto Squeegee center position calibration

* Auto Alignment accuracy measuring for table & camera

* ESE standard MES data

* Program for Auto PCB support tooling for Gridlock, Quik-Tool

* PCB barcode traceability by vision camera

2D inspection
Less, Excess, Bridge, Position

SPI close loop

Program by network

Auto Camera calibration

Auto Stencil Inspection
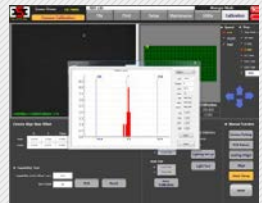
Auto Alignment
Accuracy measuring

Auto Alignment

PCB barcode traceability

ESE standard MES data

Retrofit Options

Touch screen monitor (22")

Inside Temperature & Humidity display

Auto solder paste dispenser[JAR or Tube type]

Solder paste roll height check system

Automatic Support Pin placemt

Glue Dispenser

Programmable Y (Side) Clamp pressure

Easy clip Squeegee system (one-touch)

Barcode Management (*RFID management available)

Side vacuum clamp tool

Side lifter for PCB edge support

Real Squeegee pressure closed loop

Real time squeegee pressure closed loop

Ionizer(Anti-Static) PCB cleaning

Air conditioner

Temperature controller

Center Table vacuum pressure sensor

Area sensor for satefy [Door both side]
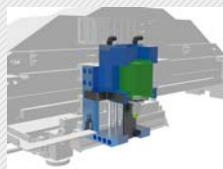
Auto solder dispenser

Solder height check

Glue dispenser

Auto support pin placement
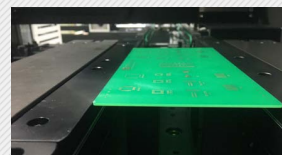
Side clamp pressure control

Temperature & Humidity display

Auto side lifter system

Vacuum Nest

Side vacuum clamp

Area safety sensor
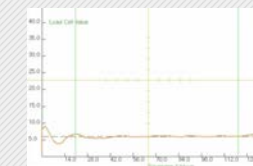
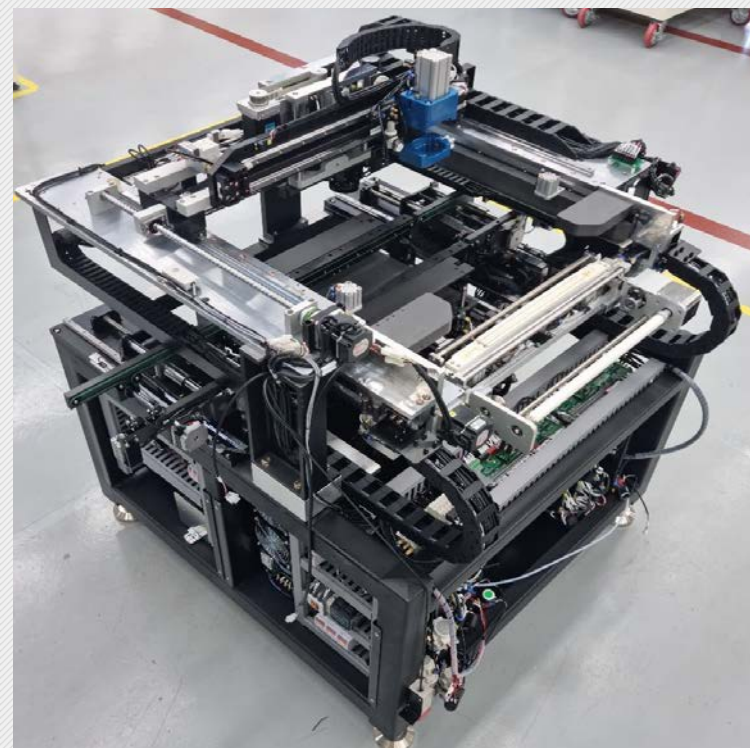Real squeegee pressure closed loop
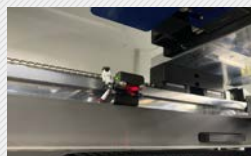
Barcode / RFID management

Ionizer cleaning
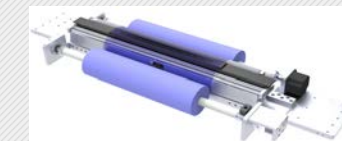
Ahorro (hybrid) Cleaning system

Hardware Feature - Strong. Stable. Useful

Basic Structure
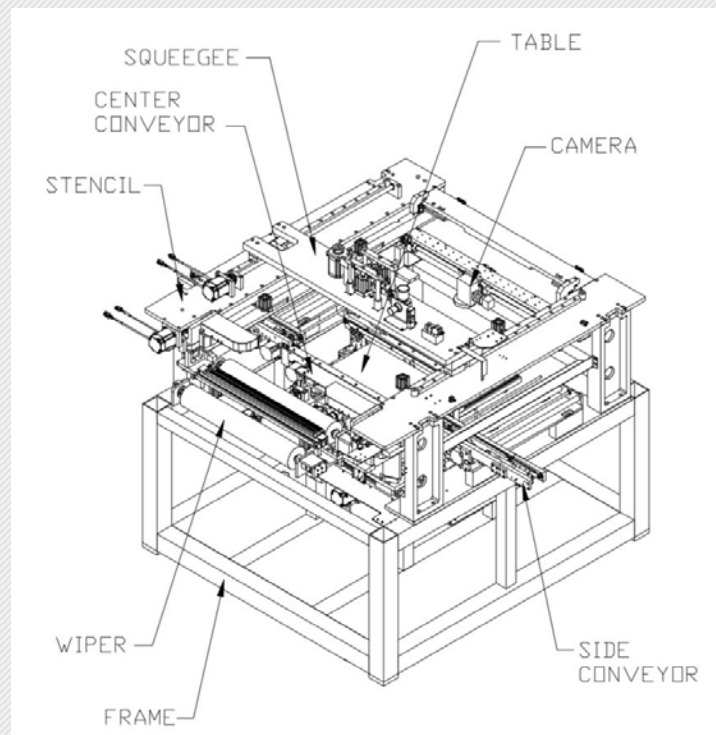
1] Servo Control Table – X, Y & Theta axis and Table Z1 & Z2

2] Servo Control Squeegee Y axis with Precise Ball screw

3] Servo Control Camera X & Y axis

4] Automatic Width adjustment 3 stages conveyors

5] Easy to change Mask stencil with Plunger

6] Wet, Dry, Vacuum Cleaning with Solvent Tank (4 liter)
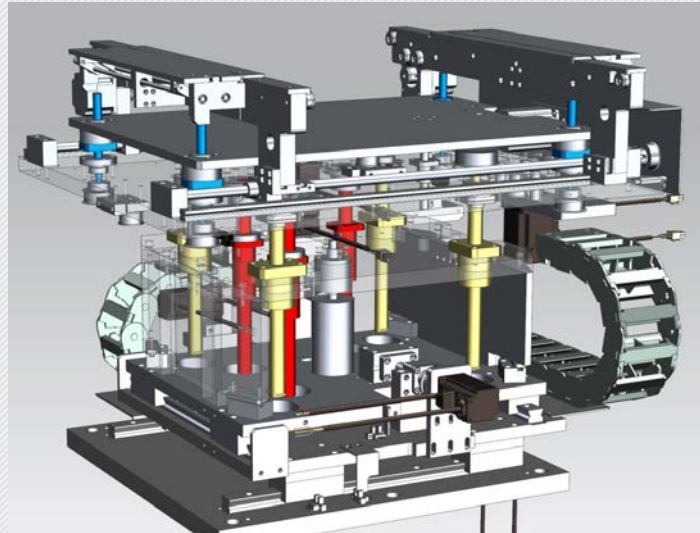
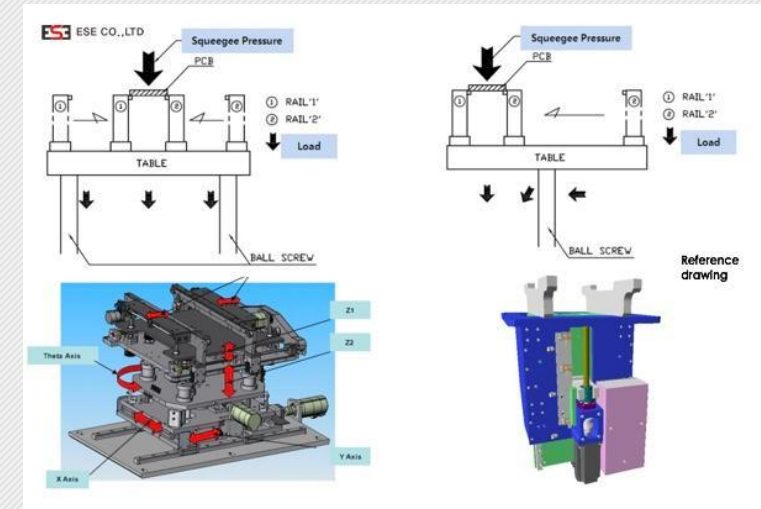7] Industrial PC with UPS

8] High stiffness frame

ES-E & H Table

4 Ball screws with High precision, High stiffness and additional 3 shafts

Servo Control for Table axis – X, Y and Theta – and Z1 & Z2

Equal printing pressure break up to guarantee high accurate printing quality and long run use without a trouble

PATENT for Theta Axis precise adjustment

*ESE printer table structure can break up a printing pressure equally unlike other printers.*

This mechanism can guarantee the machine table durability and can save Table calibration cost for long using.

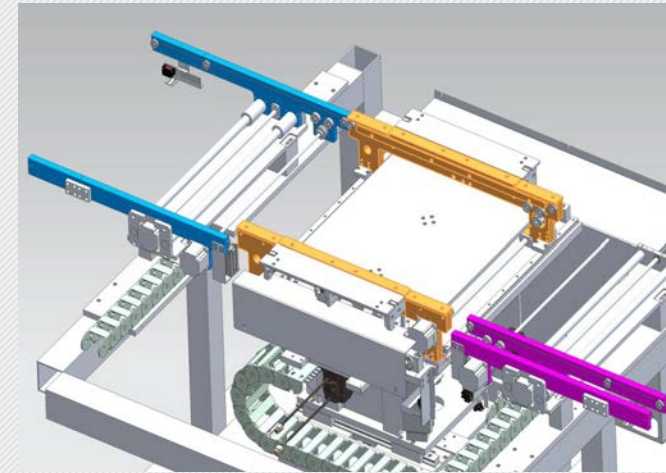**Table each axis (X.Y.Theta) accuracy can be measured anytime from embedded program**

ES-E & H Clamp. 3 Stage conveyor
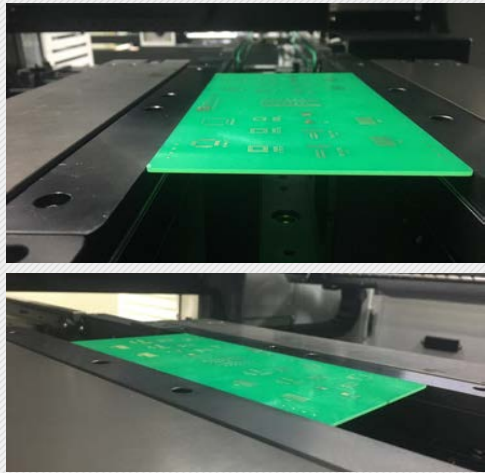
Perfect clamping - Standard

Clamp system by precise ball screw

Z Clamp

Y Clamp · Center vacuum unit
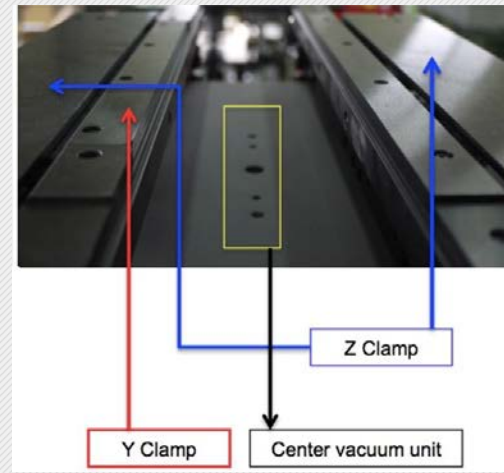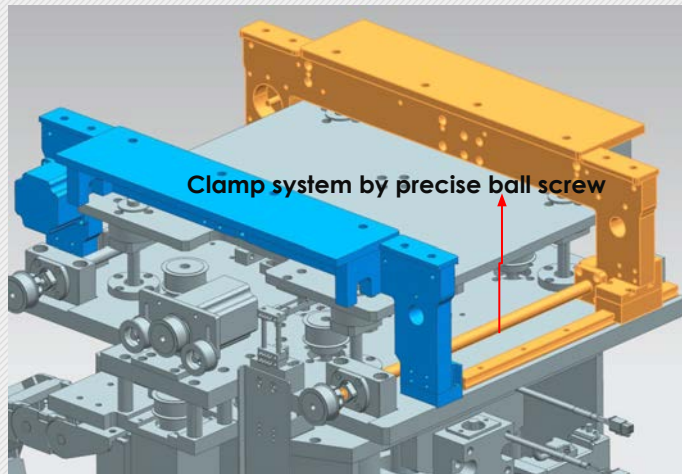
Perfect clamping - Optional

3 stage conveyor for high throughput - Standard

Z (Top) clamp by a precise ball screw driven guides a stable PCB loading and much perfect PCB clamping.

Optional Y (side) clamp and its pressure control guarantees a perfect PCB surface level to Stencil and manage each product effectively

Center vacuum unit is for individual support plate (JIG or nest) for very thin PCB (less than 0.5mm or 0.3mm) and whenever Users can put a vacuum plate onto the table

For much high throughput, all ESE printer has 3 stage conveyor system and an embedded shuttle on output convey can be applied for Back-to-Back printer

ES-E & H Squeegee –Auto calibration
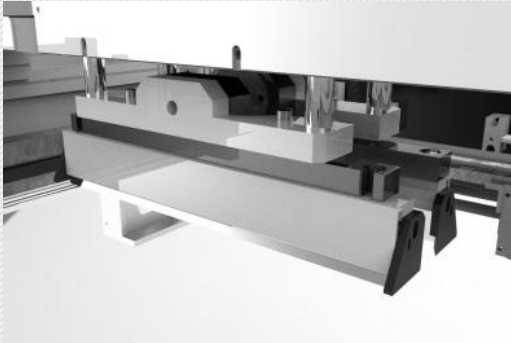
Cylinder and Motor driven printing head makes an uniform printing result.

Depends on substrate condition and solder paste, standard squeegee, Easy clip squeegee, Rubber (Urethane) blade squeegee or Enclosed print head squeegee can be applied.

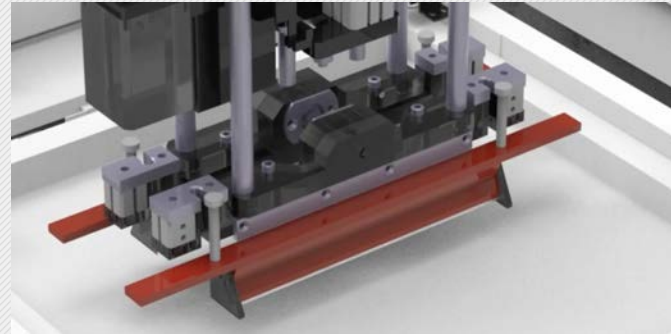**Standard Squeegee Z center position auto calibration program embedded**

Embedded Squeegee Z center position

Auto calibration program

Saving model change time

Operator convenience and protecting a

human error for squeegee setting

Useful each model squeegee pressure

managing

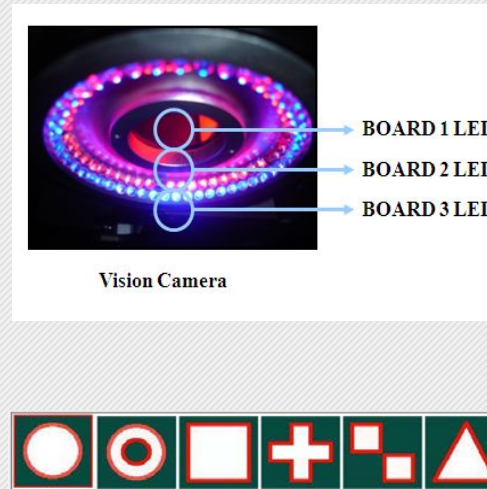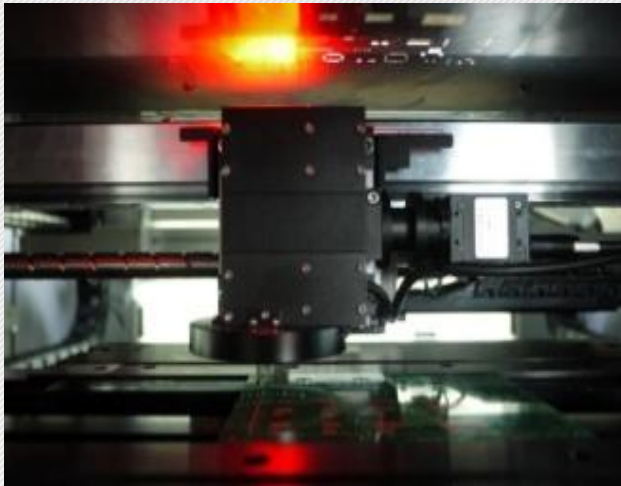**_Optional Easy Clip Squeegee_**

No need to assemble by screw

Saving squeegee change time

Rubber (Urethane) Blade Squeegee

For INK, Glue or other paste printing, Rubber

blade squeegee can be supplied

ES-E & H Vision Camera –Auto calibration

BOARD 1 LED
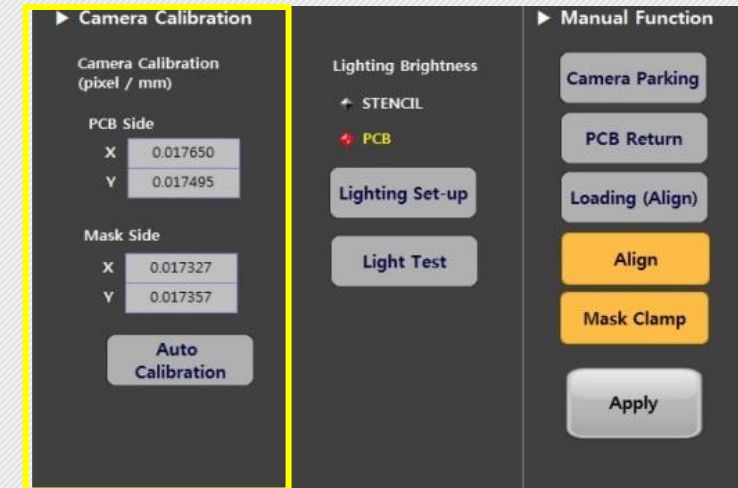BOARD 2 LED
BOARD 3 LED

Vision Camera

Camera X and Y axis driven & controlled by ball screw and Servo

Camera recognizes a mark on PCB and Stencil simultaneously

Camera 4 LED lights applied for much perfect 2D inspection and recognition as per mark color, PCB color etc
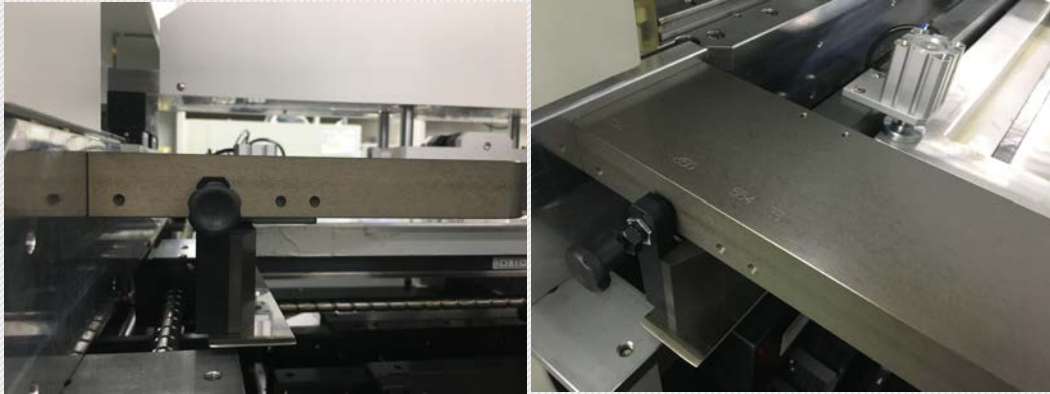
Field of View 11mm x 8mm

The smallest Mark size is 0.1mm

**For customer self-diagnose,
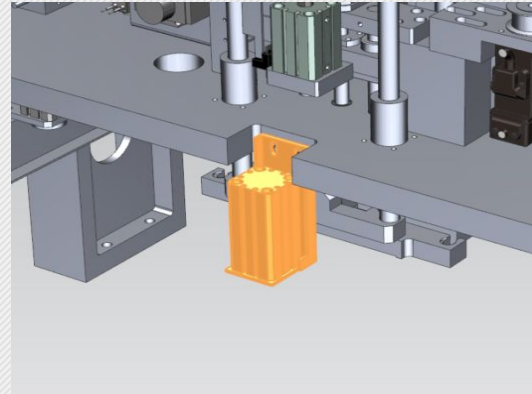Camera Auto calibration program for a focusing applied**

ES-E & H Stencil –Auto loading & positioning

With Easy to use Plunger for Mask stencil change

Depends on printer model, 550mm ~ 1800mm Mask frame can be loaded

Mask frame thickness 20mm ~ 40mm can be loaded and Max 45mm thickness frame can be loaded

Standard Stencil Auto loading, Unloading and Positioning function applied

ES-E & H Cleaning

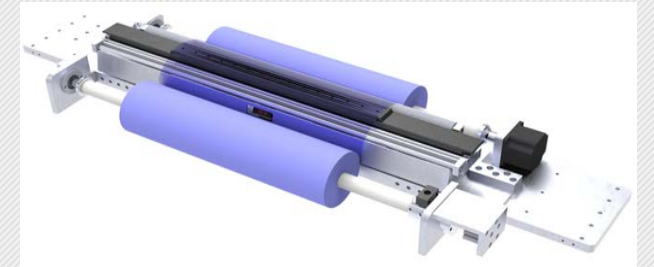**Dual vacuum applied for much perfect cleaning**

Standard Wet. Dry. Vacuum cleaning mode

Advanced-design, no-clog stencil-cleaning system with programmable paper-saving features

Cleaning speed and Cleaning mode (direction, repeat, group etc) can be programmable

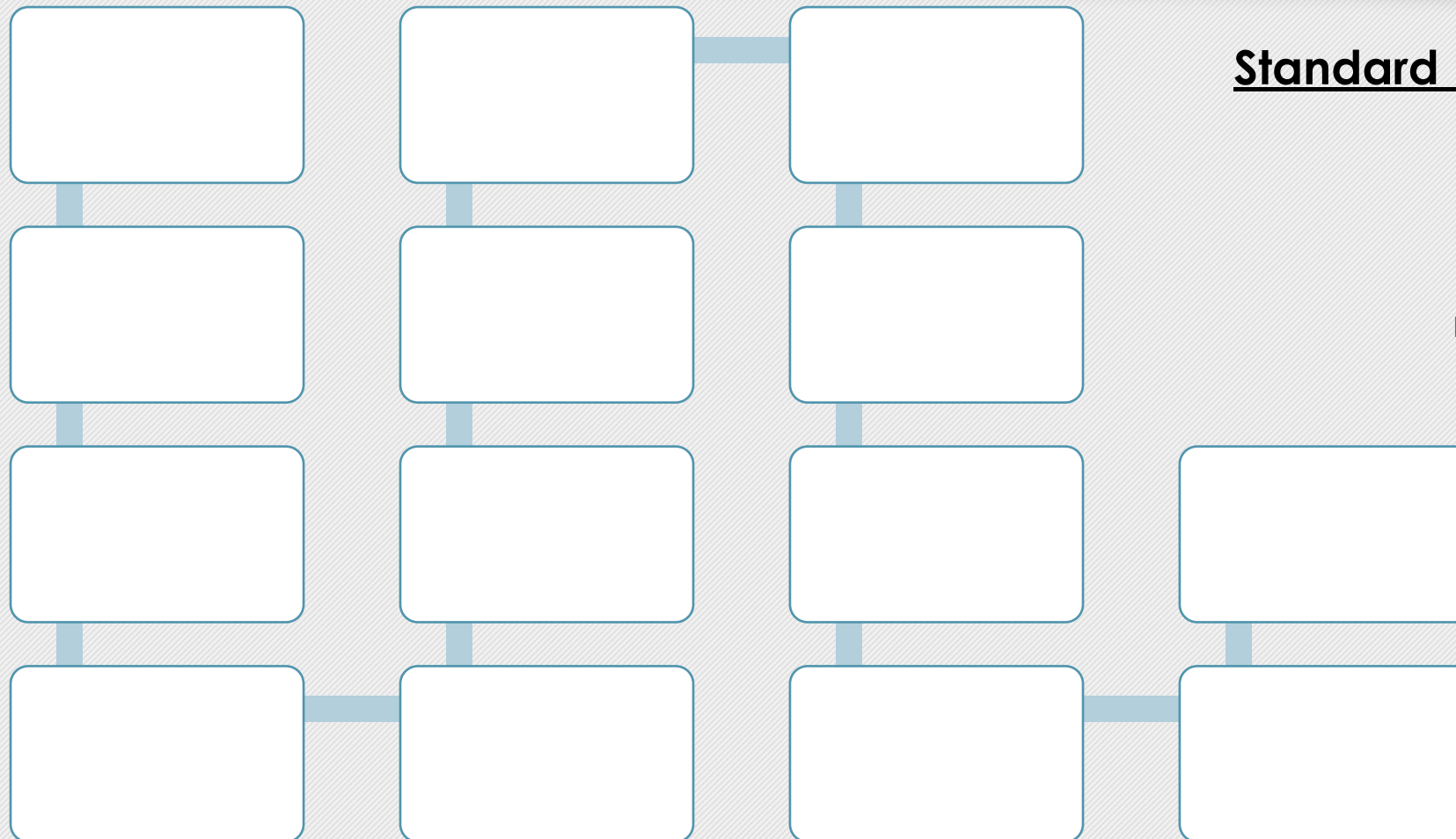**Easy & fast detachable cleaning Vacuum Metal Bar**

Innovative new technologic Cleaning system

AHORRO (Hybrid) cleaning system

Paper 40% saving
Paperless cleaning mode available for paper changing
Easy & fast detachable kit system

Standard Program – Effective. Useful
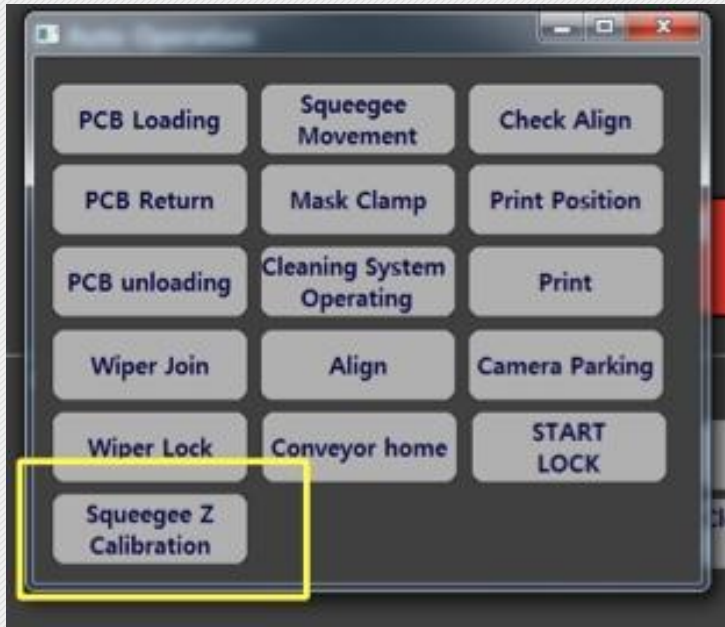
Embedded Standard Program

Standard 12 Effective. Useful program

Optional program available

Total Management system (TMS)

Hermes (machine to machine communication)

SEC.GEM / CFX

All ESE ES-E & H printer has 2-D inspection function basically to verify solder Less, Excess, Shortage and Position Error

If you want to analyze 2D inspection result, After selecting an inquire period and then click Inquire which you want to see the data on monitor

2D Inspection result data will be saved on HistoryDB.mdb.
Please copy this file and open it on Excel

Receiving information from SPI

printer X, Y, Theta axis deviation adjust

Cleaning request

The solder pasted board inspection of X, Y, Theta

Sending information to Printer

printer X, Y, Theta axis deviation adjust

Cleaning request

SPI : KOHYONG, PARMI, PEMTRON, TRI, CYBEROPTIC

Offset changing window Image

Auto Squeegee Z center position Calibration

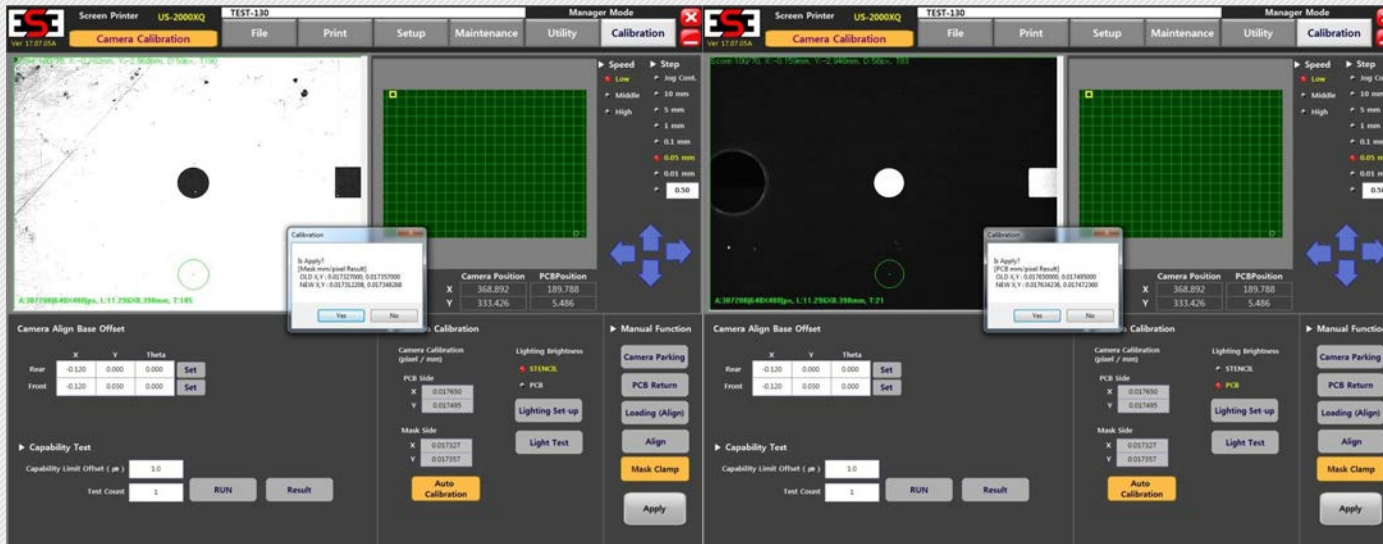## Auto Camera Calibration

What this function is :

The function is to set automatically Squeegee down position to print by a setting pressure after squeegee holder set fixing to machine

Why this function needed :

During production, squeegee blade or squeegee holder set need to be changed and in this case, the squeegee height can be different. And also in case a printing quality is not good or mask stenicl thickness changed or table up position changed, if customer use this function, customer can take much perfect printing condition of squeegee automatically than manual works

**What the automatic camera calibration is :**

The function calculates Actual image size (mm) per Pixel by recognizing Image size (pixel) to actual image size (mm) on Vision [unit : mm/pixel]

Why this function needed :

To realize the perfect Offset by motor comparing the position between fiducial image and actual position(mm)
To make sure correct camera focusing when a camera has a damage from a physical conflict or a camera replaced or a camera disassembled or re-assembled

Easy Offset Alignment

Auto Alignment accuracy measurement for Table & Camera
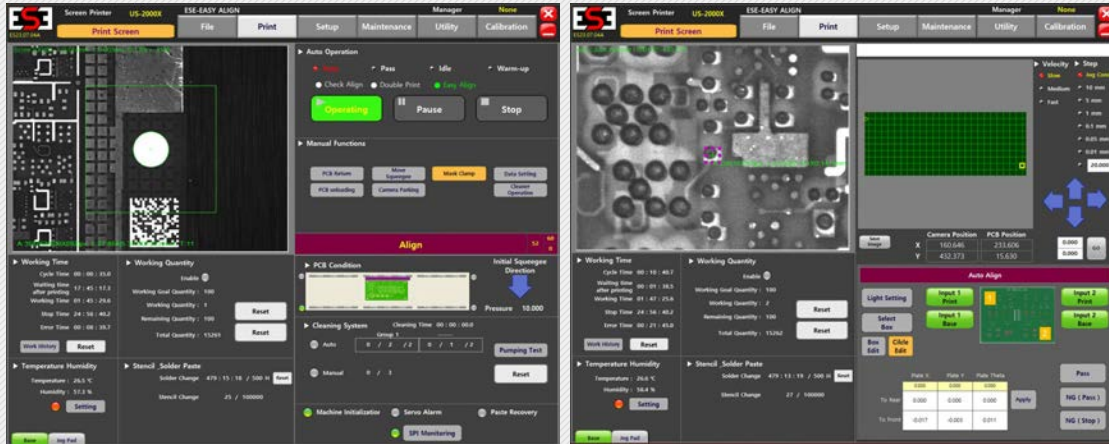
Automatic Easy Offset Alignment function eliminates User inconvenient or a mistake from Manual alignment

This Built-in program aligns X, Y and Theta of PCB and Mask stencil offset automatically and can protect a human error


What the function is :

To verify Printer alignment accuracy without any extra cost

With this function, customer can diagnose easily a correct cause if it is from machine itself , Mask stencil, solder paste, PCB or Support plate & pins etc.

If customer does this Self-Machine alignment accuracy function every quarter or monthly, he can keep Machine origin accuracy or check if he needs to call a service.

To use this function, Please use Same mask stencil and PCB to ensure test result

With this function, customer can verify Machine Table X,Y and Theta accuracy and Camera vision as well.
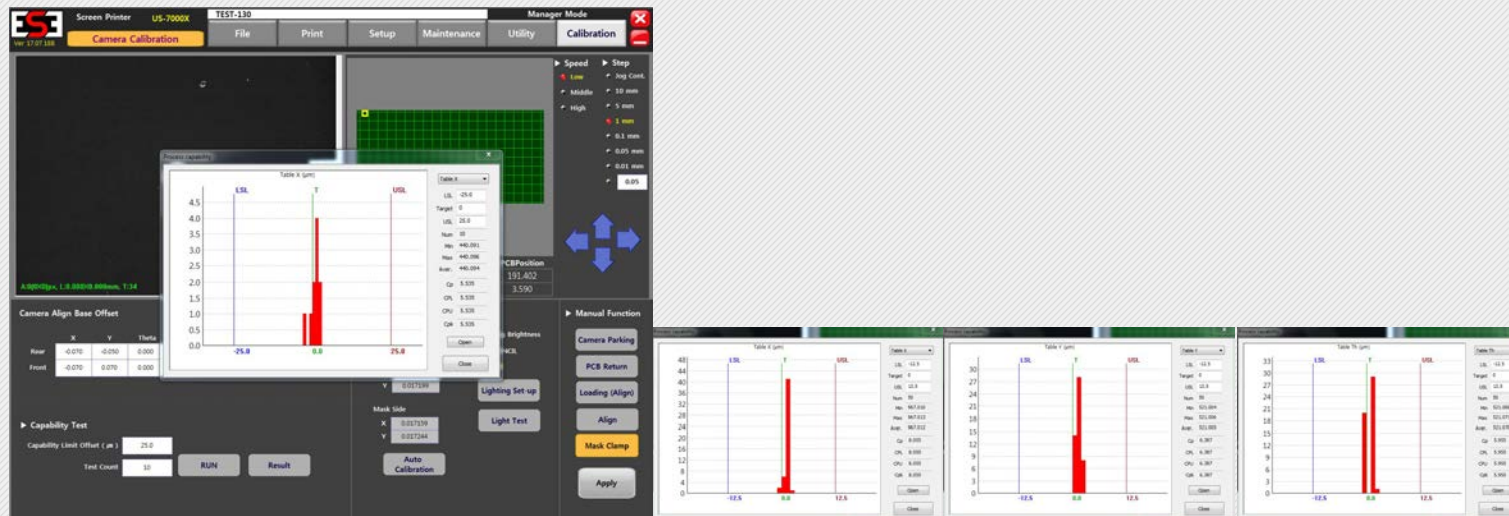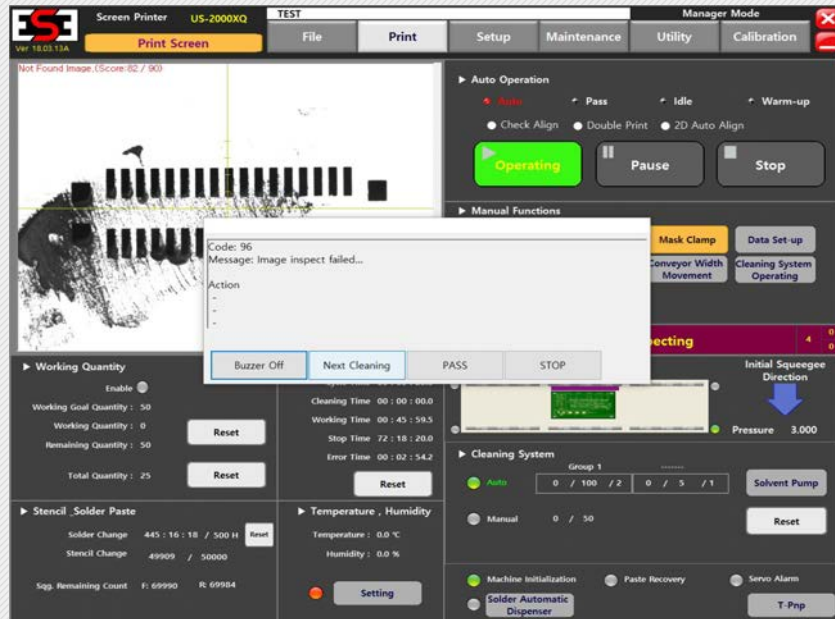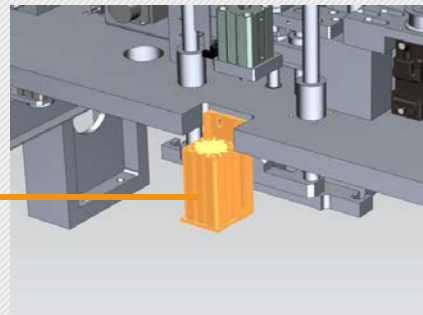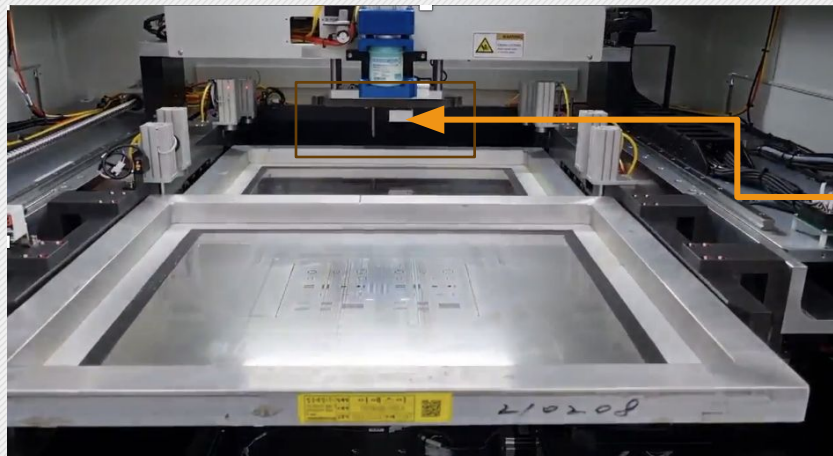
Auto Stencil Inspection

Auto Stencil Loading and Positioning

Cleaning process of Stencil is very important to get equal & good printing quality

Although ESE printer cleaning process can give a good condition of stencil, but if User can inspect the critical area stencil status on monitor and Printer can provide this automatic function, he can keep the good quality continuously

Much effective and useful Standard Auto stencil loading and Positioning is applied as **Standard for all E & H printer**
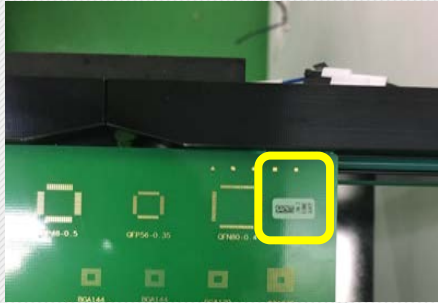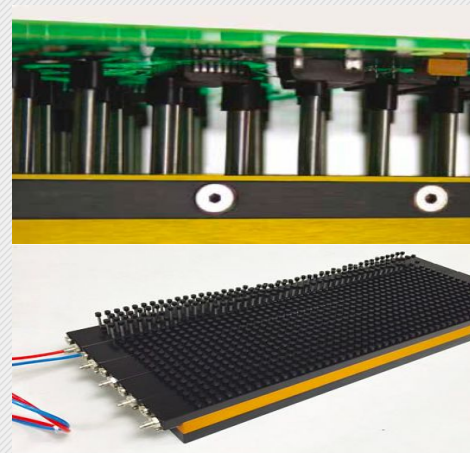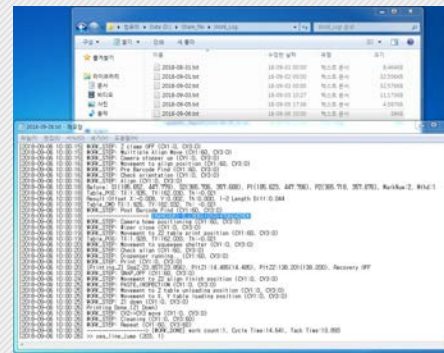
ESE printer standard camera can recognize 2D barcode on PCB (* size less than 5mm) without additional cost action.

All the data of each PCB barcode can be saved on a file on printer PC and Customer can take a file for his diagnosis or review of production

2D Barcode traceability

# Embedded program for Auto support tool

Why so many customers want to apply PCB auto support tooling (ex, Grid-Lock, GemiXlock or Quik-Tool) is that Boards that are supposed to hold components on both sides must be held securely in place during the paste printing process.
In addition, very large or thin boards require special support to keep them from flexing and limit vibrations, thus ensuring a reliable printing process.

Although ESE doesn't supply this auto support tooling itself, but ESE printer has the integrated software which can work immediately when customer connect the support tooling onto printer.
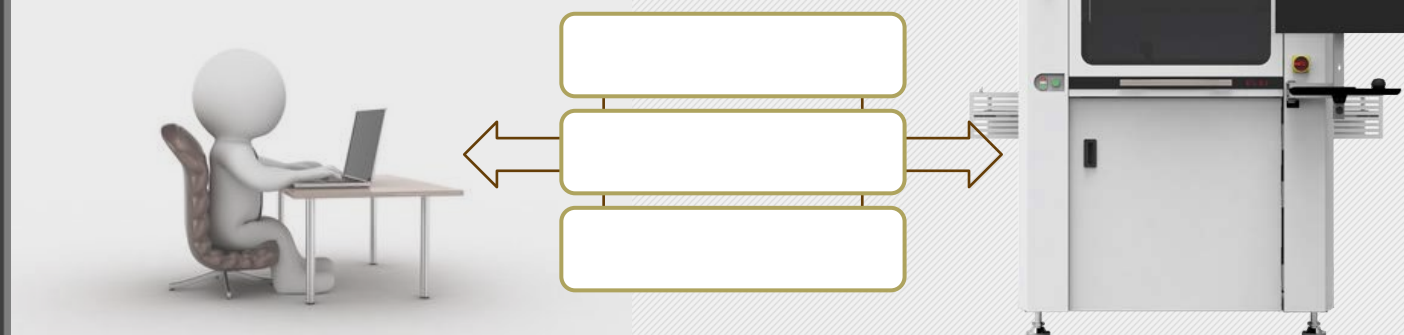
ESE printer production data collect

Programming by network
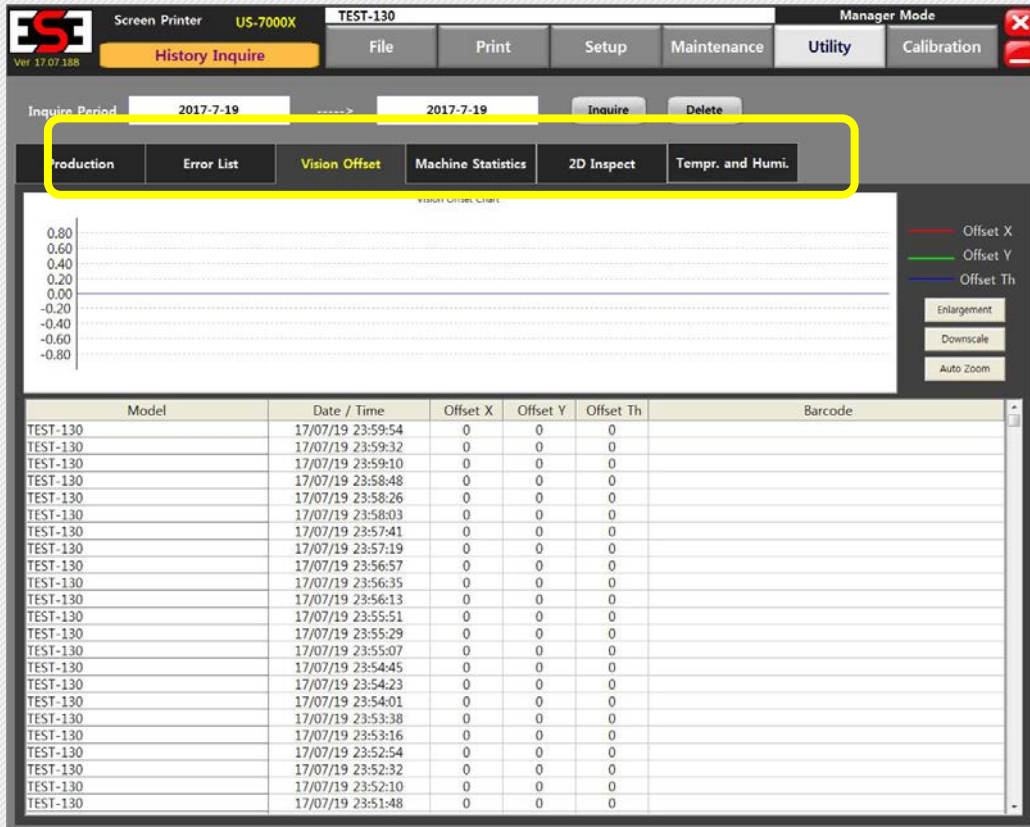
Standard MES data or Printer production data can be saved and collected as Standard

As standard function, a simple program can be made and transferred to printer by a network
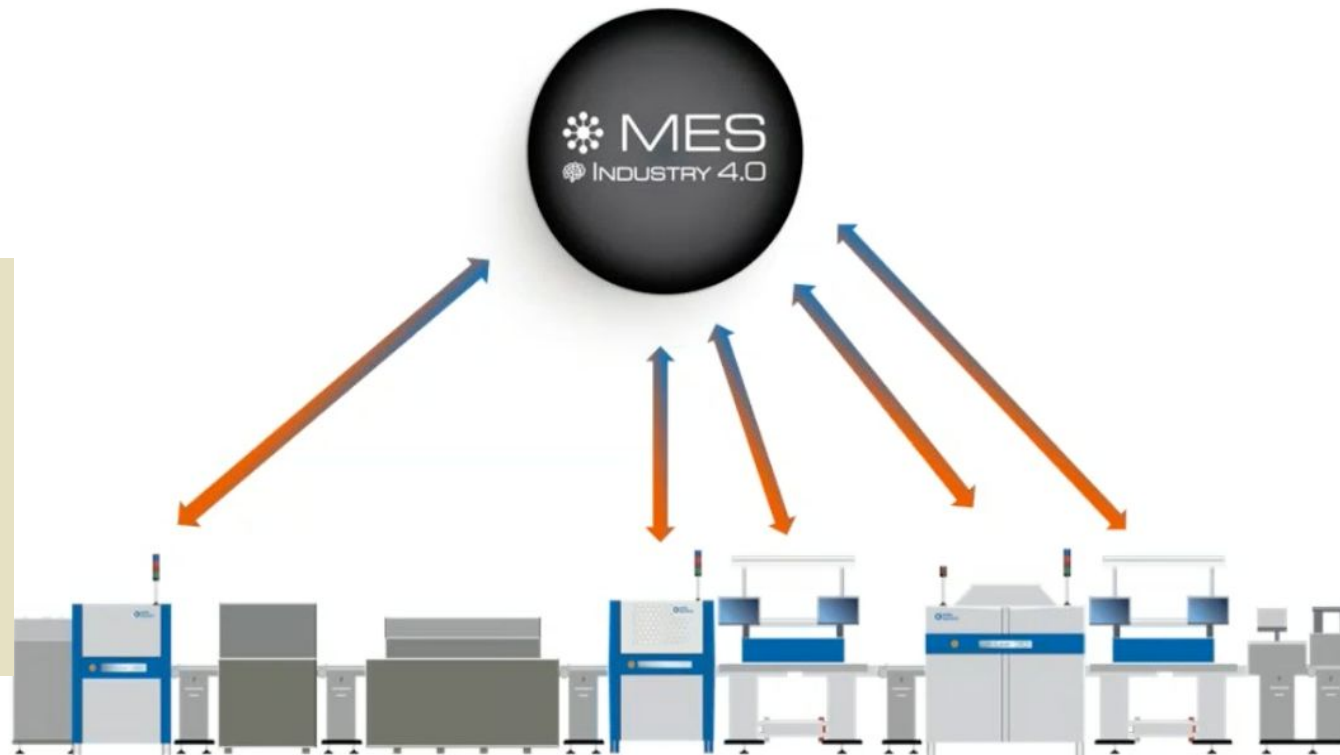
HERMES. CFX. SEC-GEM

Please consult how to make your own managing process and scenario

Vertical communication

Two-way communication
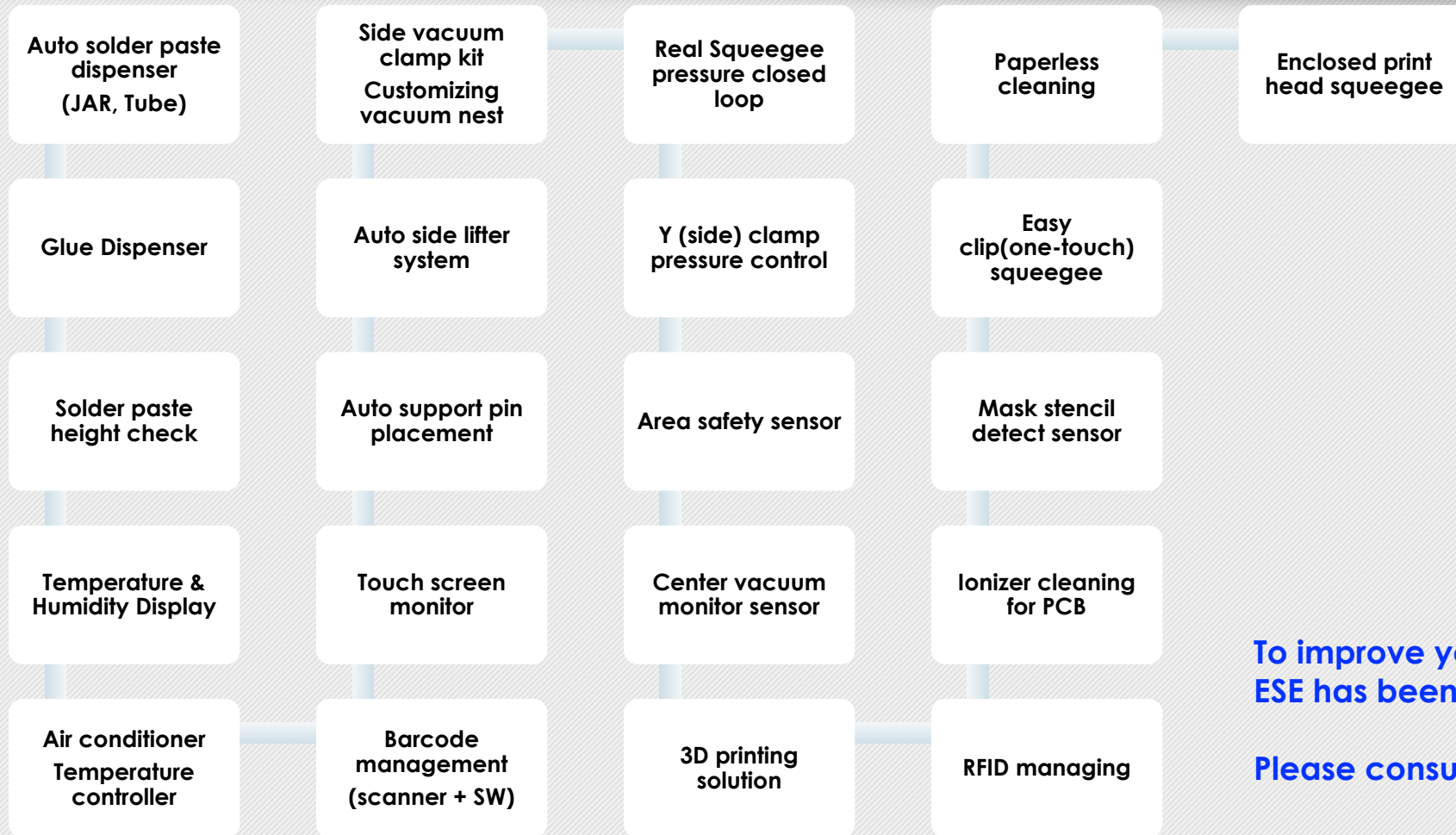
SECS.GEM
IPC-CFX

Horizontal communication

Machine to Machine communication

SMEMA

HERMES

Optional Items to improve productivity

Optional Items to improve productivity

Auto solder paste dispenser (JAR, Tube)

Side vacuum clamp kit
Customizing vacuum nest

Real Squeegee pressure closed loop

Paperless cleaning

Enclosed print head squeegee

Glue Dispenser

Auto side lifter system

Y (side) clamp pressure control

Easy clip(one-touch) squeegee

Solder paste height check

Auto support pin placement

Area safety sensor

Mask stencil detect sensor

Temperature & Humidity Display

Touch screen monitor

Center vacuum monitor sensor

Ionizer cleaning for PCB

Air conditioner Temperature controller

Barcode management (scanner + SW)

3D printing solution

RFID managing

**To improve your productivity,
ESE has been supplying a retrofit optional items**

Please consult any optional items if needed

Automatic Solder Dispenser _ JAR type

Automatic Solder Dispenser for

JAR Type solder paste bottle

1] 500g Solder paste bottle

 [Normal bottle can be used as it is after removing Cap]

2] Dispenser can be modified depends on a bottle size

3] Dispenser move left to right

4 With only Outlet change, Simple cleaning and Cleaning finishing better than existing other dispenser

5] No Solder tailing
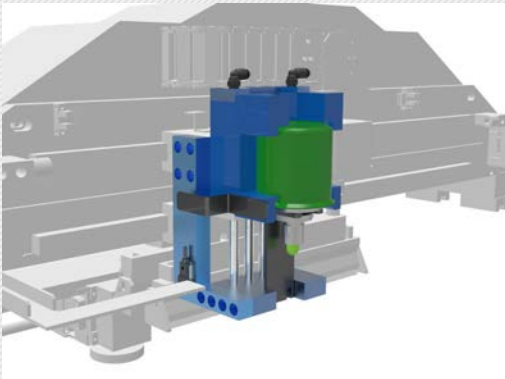
Automatic Solder Dispenser for

Tube Type solder paste bottle

1] 500g Solder paste

2] With rotary cylinder, it can be rotated by 90 degree

3] Compared with JAR Type, Solder consumption is better (5%)

4] Solder quantity can be adjustable

Glue Dispenser

Glue Dispenser
Glue Dispenser
1] Discharging time : 0.05~99.99s
1] Discharging time : 0.05~99.99s
2] Control : Electro Pneumatic
2] Control : Electro Pneumatic
3] Barrel : 5cc
3] Barrel : 5cc
4] Available Nozzle (Inner Diameter _ mm) :
4] Available Nozzle (Inner Diameter _ mm) :
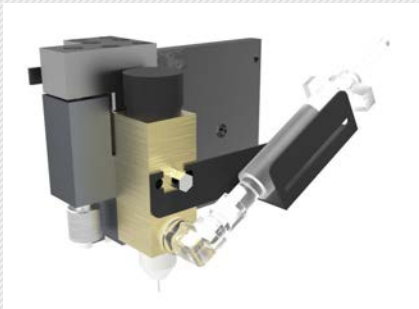
0.18, 0.21, 0.25, 0.26, 0.29, 0.34, 0.42, 0.52.
0.18, 0.21, 0.25, 0.26, 0.29, 0.34, 0.42, 0.52.
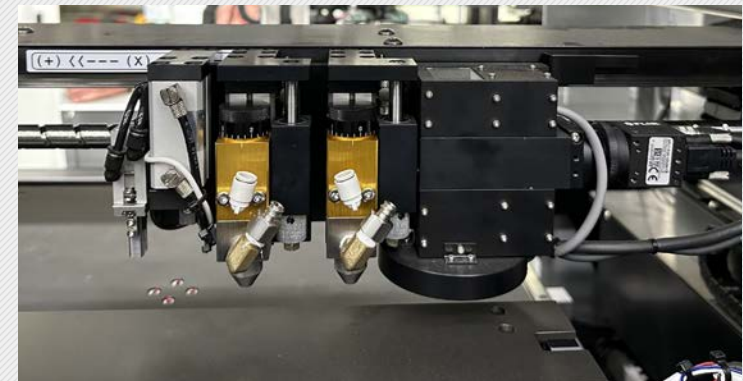0.61, 0.72, 0.92, 1.11, 1.25, 1.43, 1.64, 1.64, 2.27
0.61, 0.72, 0.92, 1.11, 1.25, 1.43, 1.64, 1.64, 2.27

5. Available Fluid : UV Bond, Tuffy, Grease oil, lubricative liquid
5. Available Fluid : UV Bond, Tuffy, Grease oil, lubricative liquid

Solder paste Dispenser

ESE will update for this option

# Solder paste height check

Temperature & Humidity Display

Solder paste rolling height check sensor

It checks the setting height during solder pasting and feedback to program.

ESE recommends to use this option with Automatic solder dispenser to get much perfect production condition

Temperature & Humidity Display option

With this option, Customer can monitor current machine inside temperature and humidity to manage much perfect machine condition
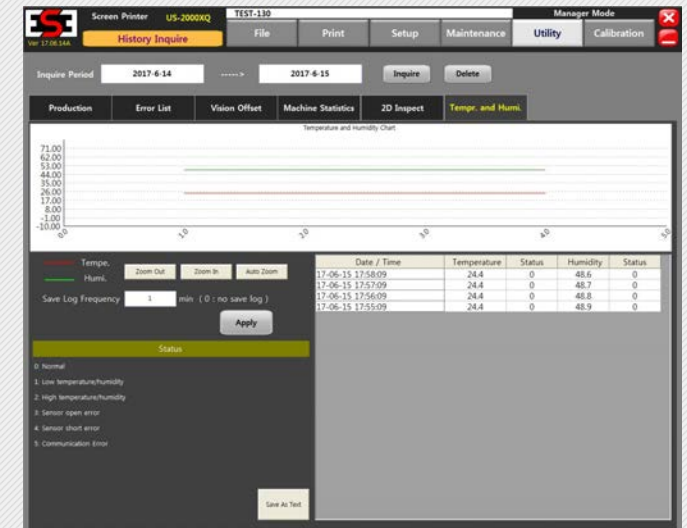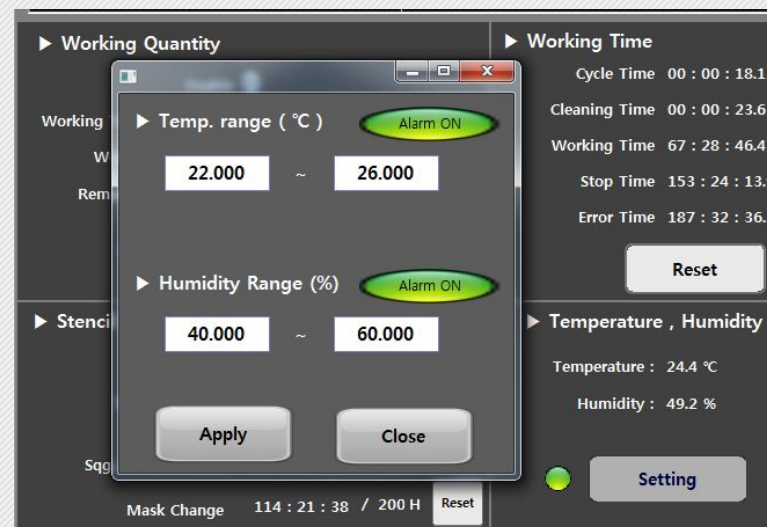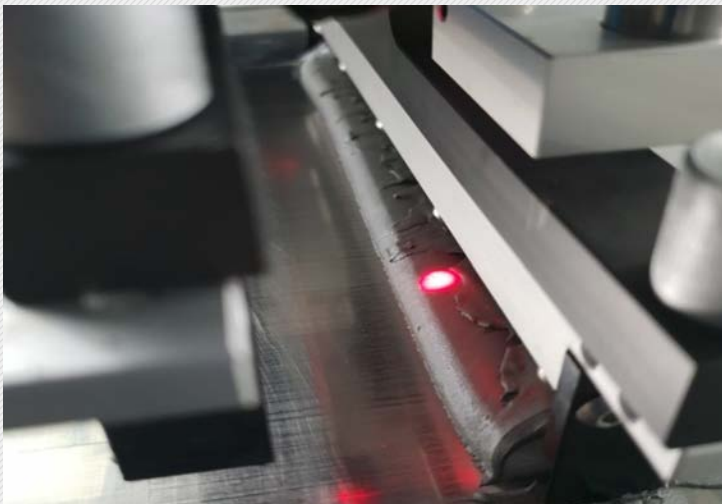
Air-conditioner . Temperature controller

Side vacuum clamp kit. Customizing Vacuum nest

Optional Air conditioner
☐ Only cooling

Optional Temperature Control system
☐ Cooling and Heating

ESE can provide a perfect vacuum plate based on customer PCB design

Vacuum PAD Support Plate
• In case PCB thickness is too thin (0.1mm ~ 0.3mm etc) and customer needs to consider much better & perfect clamp, this kind of Vacuum plate can be made based on customer PCB Gerber file
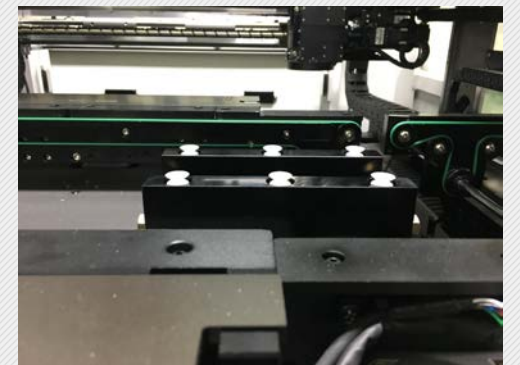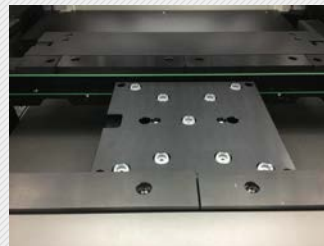
Electric Magnetic Support Plate
• In case Substrate is a kind of Metal having much high warpage, ESE can apply Electric magnetic support plate

ES-E & H Side Vacuum Clamp Tool

*ESE Printer covers normally PCB warpage +/-0.5mm In case of PCB warpage is out of ESE standard, Side vacuum clamp tool needs to be considered for better clamp

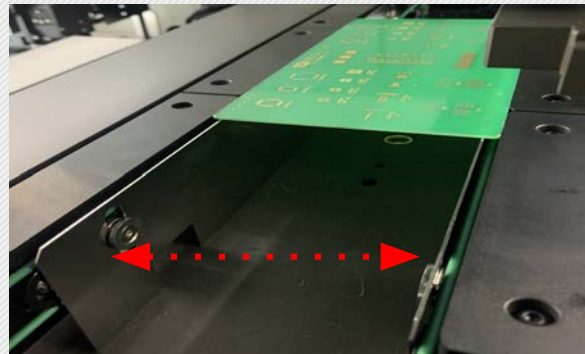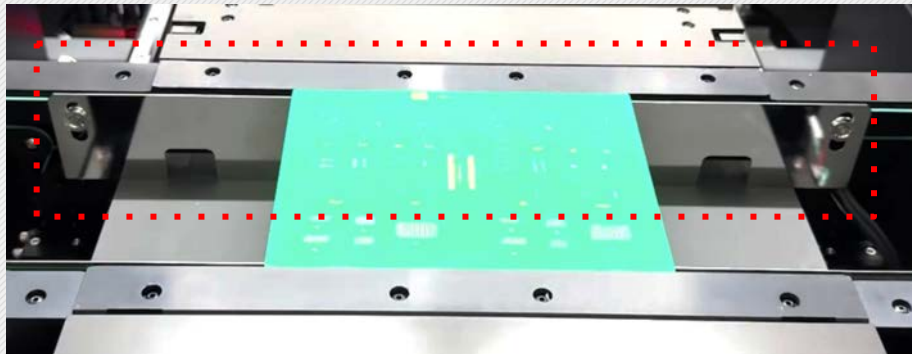*This tool is included into US-LX3 and 5 model without a cost .

Auto Side lifter system

Automatic Support Pin Placement

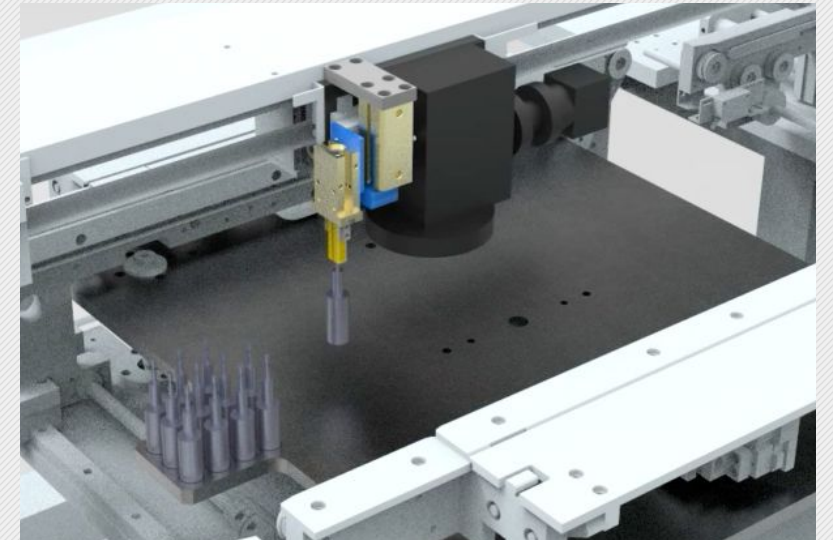For much perfect PCB edge support and a magnetic support plate or pin can not support PCB edge,

Auto side lifer (2 blades) system can be applied

Automatic Pin Placement is to precisely place and remove pins.
Pin location can be designated by User with Gerber file.

Pin positions are software programmable ensures quick, easy and repeatable product changeover

Touch Screen Monitor
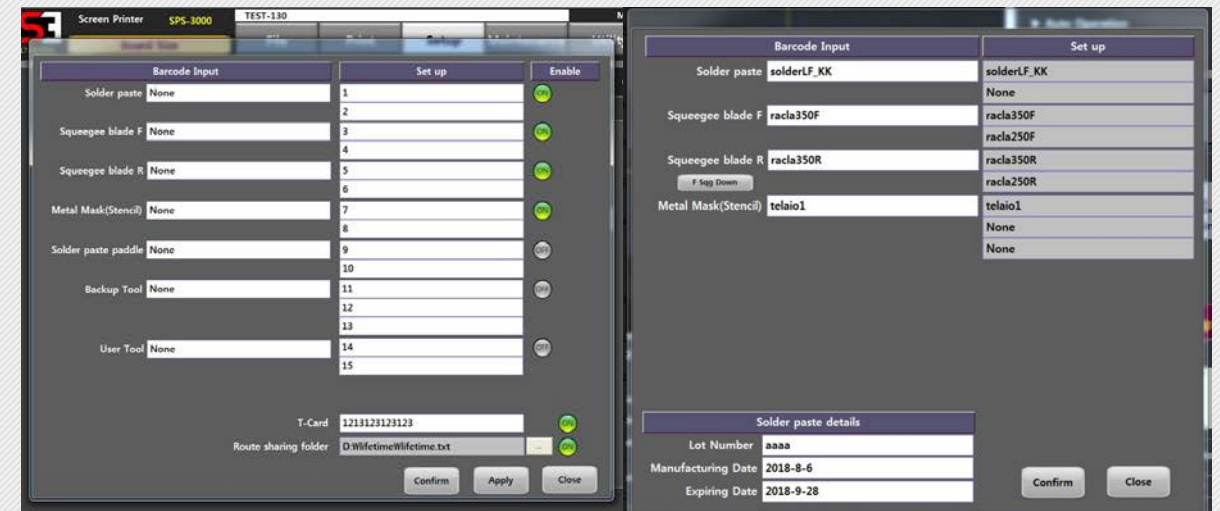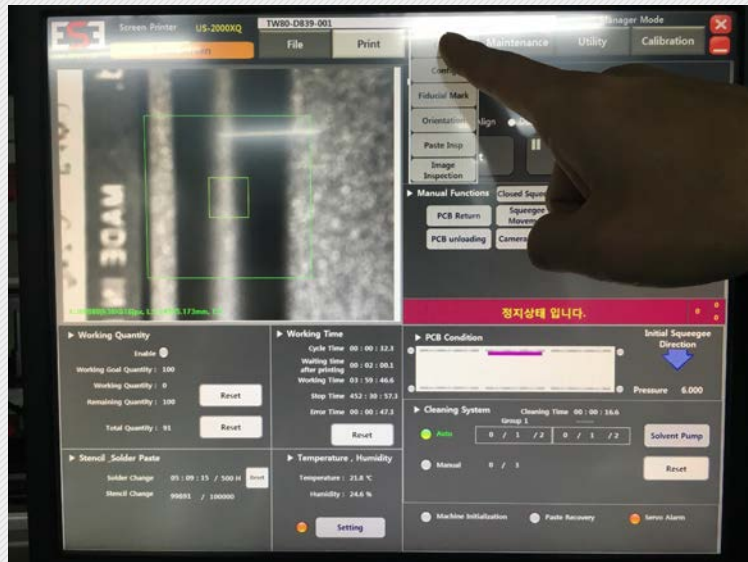
Barcode Management (Scanner + SW)

Touch screen Monitor

All program menu touch

With Barcode managing system, Customer can manage each production materials _
Stencil, Solder, Squeegee ETC.

All data can be saved on FDC file

Real squeegee pressure closed Loop

Side (Y) clamp pressure control

Real squeegee pressure closed loop [Load cell]
: This optional function is to verify if the actual squeegee pressure for actual printing at printing starting point is same with the programmed squeegee pressure. This is to confirm that a printing pressure is same as like the setting pressure.
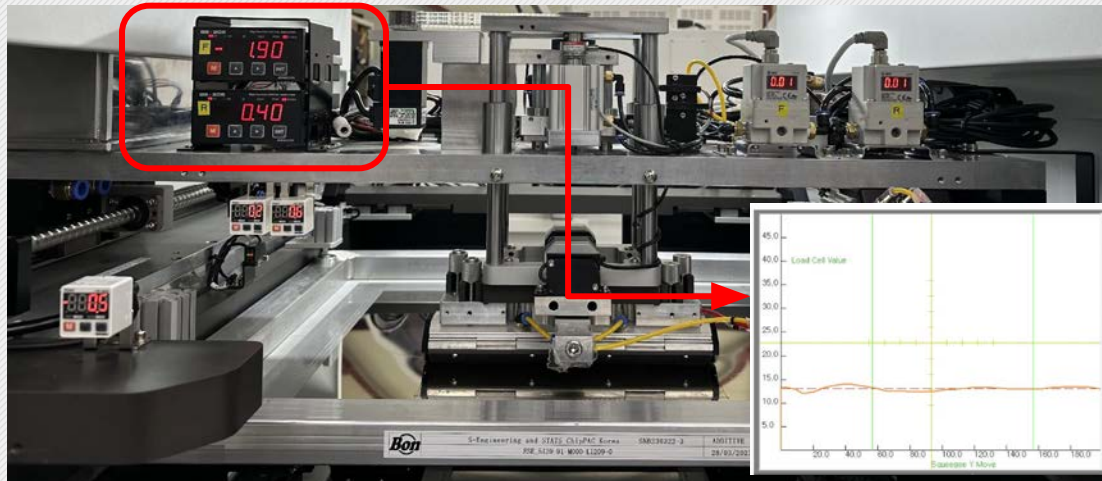
Real time squeegee pressure closed loop [Load cell]
: This optional function is to control actual printing pressure during whole printing.
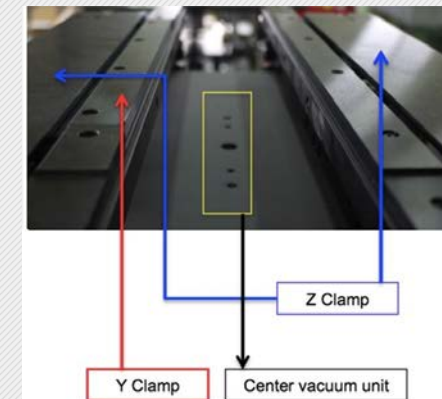
Real time squeegee (Front & Rear) pressure closed loop system

Digital indicator located to inside Squeegee head cover

Printing area pressure tolerance +/-1kgf/sec (+/-38um/sec)

Y (Side) Clamp pressure can be programmable and can be saved per each product model

Area Safety sensor

Center Vacuum pressure monitor sensor

Mask Stencil detect sensor

Safe area sensor is to protect unexpected accident.
In case an operator just put his hand or some material without machine working stop, the machine will give Alarm with the sensor located each side of front column.

Center vacuum pressure monitor sensor will show to an operator current center table vacuum

Mask stencil detect sensor

Enclosed Print Head Squeegee

Easy Clip (one-touch) Squeegee

Special print head squeegee system for Packaging printing solution

Recommended to use after recharging 1000~1500g Solder
Keep same solder viscosity continuously with Automatic solder mixing & rolling system

Automatic Solder rechargeable system

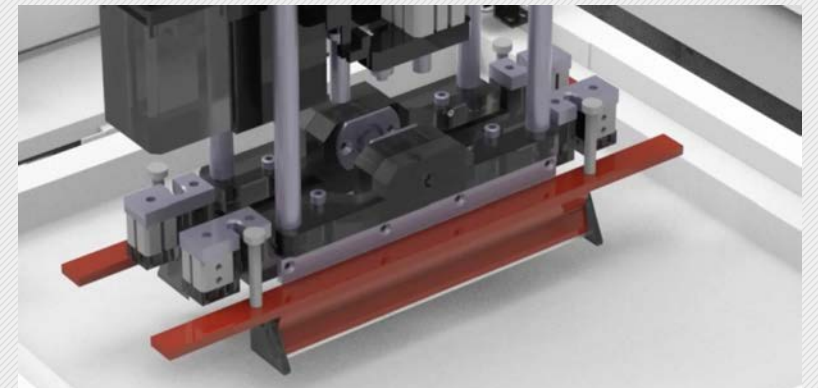*Note :*
This kit should be keeping in storage box (temperature 4 ℃ + max 7 days)
In case out of this standard, Please use after Whole kit cleaning and Solder recharge

Easy Clip Squeegee

No need to assemble by screw

Saving squeegee change time

Paperless Cleaner kit

AHORRO (Hybrid) cleaning system

Ionizer Cleaning system for PCB

Cleaning capability _ 1005mm. 0.4 Pitch (recommended)
Capability size _ 350mm and 500mm
(*500mm paperless cleaner kit will be reconfirmed in 2019)
Mask stencil Thickness- 0.1mm over

Replacement cycle _ every 6 month
Cleaning cycle _ every 4 or 8 hours per production cleaning
*During Paperless cleaner kit cleaning,
Mask stencil cleaning needs to keep much perfect condition for production
Blade only replacement available

No paper for cleaning, No IPA liquid No Solvent tank
No need a space, extra cost for paper stock
**Easy detachable structure for time saving**

AHORRO (Hybrid) Cleaning system

ESE new innovative cleaning system (Hybrid cleaning system) allow you to select one of 3 cleaning modes depends on your production or production managing situation

- *Standard cleaning mode*
- *Eco cleaning mode (paperless cleaning)*
- *Wipe roll paper saving 30-45% against standard paper cleaning system*
- *Paperless kit can be detachable*

Ionizer Cleaning system for PCB (Anti-Static)

This system can be located at Input conveyor upper side in order to clean PCB surface before loading for printing
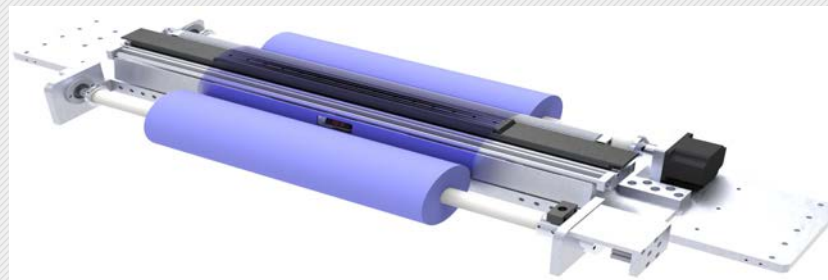
3D printing solution

RFID management

Reference printing for 3D (stepped, notched) printing of lead frame

To give a perfect printing solution of 3D stencil printing, ESE needs a customer printing process and its detailed specification

RFID management

ESE printer can read PCB barcode (size less than 5mm) by camera OR can supply Barcode management system with software as option

Additionally, ESE can apply RFID reading option as per customer details

ESE needs to get customer RFID information in detail to make the optional reading system