Samsung Techwin presents the new next generation component placer platform – the SM400 series. The SM400 series machines offer the world highest part placement capability among those of the same class by evolving the highly successful SM series machines.

From microchips for mobile devices to large boards for display, SM400 series machines provide optimum placement solutions to various needs of customers through the super high-speed On-The-Fly part placement mechanism and the vision system with high accuracy, yield and reliability. In addition, the series of component placers are provided with identical hardware and software to maximize productivity and the new ergonomic design maximizes customer satisfaction.
The new SM400 series component placer provides optimum solutions to customers who desire to produce high quality products from mobile devices of high speed/high precision and DSC products to large display products. It is the next generation mounter platform from component placer by enhancing the modularity and performance of existing SM series machines in order to actively respond to various market requirements for changes.

New **Smart** Platform

**Simple & Easy**
- Intuitive operating environment through ergonomics analysis
- Smart system architecture for ease of maintenance and maximum stability
- Easy set-up identification through application of color coded clamp for feeder

**Modularity & Availability**
- Convenient inline operation through unification of main modules and inline platform
- Parts job change through reinforced networked parts library (Vista)
- Reinforced applicability to parts through reinforcement of high resolution camera and parts registration algorithms
- Maximum PCB size among machines of the same class

**Reliability & Throughput**
- Robust ball screw drive overhead gantry design
- True On-The-Fly vision processing of all components
- Unique conveyor designs to maximize board handling efficiency
Reliability & Throughput

Realization of the highest throughput among machines of the same class

The SM400 series machines realized the highest placement performance with two gantries by adopting the twin servo mechanism to the Y axis and flying vision to minimize the moving speed of the head for part placement.

High Speed X-Y Driving Mechanism

The twin servos system applied to each axis of the gantry structure allows high speed placement by strong accelerating force.

- Reinforced absolute accuracy and repetition accuracy
- Reduced setting time
- Increased rigidity of driving system
- Implementation of high acceleration and low vibration
- Self motion controller

Placement Accuracy Calibration System

Chip \(50 \text{ (Cpk 1.0)}\), IC \(30 \text{ (Cpk 1.0)}\)

The newly upgraded placement accuracy calibration system automatically checks and calibrates the pickup point offset, head offset, C/V offset, etc. to allow reliable part placement.

Modularity & Availability

Reinforced Modularity — Providing Optimal Solution

SM400 series machines are high scalability and allow easy optimization according to production type by unifying the operating system of hardware and software so that reconfiguration of lines and program portability are easily accomplished. Therefore, solutions can be quickly provided.

Part Placement through Nonstop On-The-Fly Recognition

The unique On-The-Fly image recognition technology of Samsung Techwin own that allows part recognition without stopping after part pickup, minimizing the time of movement between pickup position and placement position and maximizing the placement speed by zeroing the recognition time.

- Placement Speed: 42,000 CPH (IPC9850), 55,000 CPH (Optimal Condition)
- Zeroing of PCB Loading Time

By adopting a dual work conveyor and shuttle inlet conveyor of first-in-first-out type, the PCB feeding type was minimized and gantry efficiency is maximized due to elimination of a common work area, thus the actual productivity. Each gantry can work at full speed independently without risk of interrupting the opposing gantry. In addition, it supports various placement modes according to production characteristics and board size.

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Reinforced Part Library Support and Quick Part Registration

It has an enhanced part registration library to allow quick part registration as well as stable part recognition and placement, and supports the polygon recognition related to unregistered part to allow the parts of complicated shape to be registered easily.

Reinforced Component Applicability by the Support of Mega Pixel Camera

The mega pixel camera allows the placement of parts from 0603(01005) micro chips. The SM400 series machine also allows recognition of larger parts with fine pitch or balls using 45mm camera such as \(42mm \times 0.4mm\) pitch by adopting a mega pixel vision system for the Stage camera.

Productivity per Unit Area

The highest productivity compared to the area of machine: 26,700 CPH/m²
**Simple & Easy**

Adoption of New Ergonomic Design

The operation environment of the SM400 series machines has been developed through careful consideration of the user oriented environment after ergonomics analysis. The high efficiency of operation space has been achieved through unification of the size of chip shooter and the odd shaped machine to maintain perfect straightness for inline configuration.

**User Convenience**
- Position of Monitor and Operation Panel
  - The height of the machine was lowered through ergonomic redesign and the operation panel and keyboard position were optimized for convenient operation.

**Maintenance Convenience**
- Utility Position Improvement
  - All utility connections are installed inside the machine to provide a clean and safe environment.

**Location of Grease Injection Nipple**
- For the grease injection that is periodically performed during maintenance, the position of the nipple was considered for convenient grease injection.

**Easy Feeder Identification**
- Easy differentiation of feeder state

**Easy Differentiation of Feeder State**
- LED
  - Green: Normal operation
  - Red: Part placed at incorrect position
  - Yellow: Insufficient quantity of remaining parts

**Dual Operating Consoles**
- Two operating consoles allow access to system controls from both the front and rear sides of the machine.

**SM400 Series**

From micro chips for mobile devices to large boards for display - SM400 series machines provide optimum placement solutions to various needs of customers through the super-high speed On-The-Fly placement mechanism and the vision system with high reliability.

**SMD Configuration Diagram**

**Magazine Loader**
- Transfers PCBs loaded onto the magazine rack to the next process machine using the pusher.

**Vacuum Loader**
- Picks up a bare PCB by vacuum and transfers it to the next process line. It can be configured into the line with the magazine loader.

**Inverter**
- Reverses PCB by 180° to perform work on both sides.

**Screen Printer**
- Places various electronic parts (chip, IC, etc.) on the PCB surface on which solder cream is printed.

**Vision Inspection System**
- Inspects the quality of printing, part placement and soldering in the SMD line. It is divided into a print inspection device, placement inspection device and soldering inspection device.

**Shuttle Gate Conveyor**
- Provides an intermediate path in the line in order to minimize the moving line of the operator.

**Shuttle Dual Unloader**
- As dual type machines, they check whether PCBs transferred to the shuttle conveyor after quality inspection are defective, and will load only non-defective PCBs.

**New Smart Platform**

Provides space for visual inspection of the part placement status and facilities for visual inspection.

**SM431 Chip Mounter**
- Provides space for visual inspection of the part placement status.
The SM431 is a high speed chip shooter with 2 gantries and 16 heads. It achieves high productivity while requiring a minimum amount of floor space. The high speed chip shooter is the best in its class requiring 25% less installation room while productivity per footprint is increased by up to 40% when compared with the SM411. In addition, it adopts a new flying vision system that reduces head weight and improves reliability for the optimization of high speed part placement. The SM431 can place a variety of different chips, from the basic 0402mm chip up to 12mm IC parts, and can handle PCB’s up to L460 x W460mm.

**Features**

- **Placement Speed**: Chip 42K CPH (IPC9850)
- **Applicable Parts**: Max. 0402 ~ 12mm (Part height H=7mm)
- **Placement Accuracy**: ±0.03mm/Chip
- **Maximum PCB size**: L330 x W250 x 2Lane (Standard) / Max. L460 x W460 x 1Lane
- **External Dimension**: 1,240mm(L) x 1,660mm(D) x 1,420mm(H)

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**New Smart Platform**

From micro chips for mobile devices to large boards for display - SM400 series machines provide optimum placement solutions to various needs of customers through the super-high speed On-The-Fly placement mechanism and the vision system with high reliability.

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**Compact High Speed Chip Shooter for Long Board**

The SM431L is a high speed chip shooter optimized for LED BLU, lighting and long board based on the SM431 platform. It reinforces the applicability to LED placement by realizing functions specific to the LED, including LED rank management, special nozzles for LED, bowl feeder applicability and remaining part quantity management. In addition, the SM431L supports IT feeder systems and motor driven feeders to prevent part misplacement and to improve automatic recognition and productivity.

**Features**

- **Placement Speed**: Chip 30K CPH (IPC9850)
- **Applicable Parts**: Max. 0402 ~ 12mm (Part height H=7mm)
- **Placement Accuracy**: ±0.05mm/Chip
- **Maximum PCB size**: L540 x W460 x 1Lane (Standard) / Max. L750 x W460 x 1Lane

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**LED Rank Management System**

As a system that manages the luminaire of LED parts by rank, it compares and manages produced products and the rank information of LED parts by applying a barcode system.

- **Rank Warning Function (Part Misplacement Prevention)**
  Sounds an alarm alerting the operator to prevent part misplacement when there is difference in the rank between a product being produced and a part.
- **Automatic Rank Change Function**
  Automatically recognizes a part of the corresponding rank for placement when changing the rank. Since the rank can be changed without stopping the machine, it improves production efficiency and operating convenience.
- **Remaining Part Quantity Alarm Function**
  Shows the remaining part quantity during placement to prepare for part shortages in advance.

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**Reinforced Applicability to Long Board**

- **The SM431L allows part placement on large PCBs for LED BLU, LED lighting and display:**
  - Max. L750 x W460
- **Greatly maximizes productivity per square meter.**
  - 47,000 CPH (Optimum Condition)
  - Productivity has been increased by more than 77% when compared with the SM411.
**Dynamic Chip Shooter SM411**

The SM411 has achieved the highest placement speed of 42,000 CPH for chips and 30,000 CPH for SOP parts (based on IPC, respectively) in the world among machines of the same class by adopting a dual gantry mechanism and On-The-Fly method, for which Samsung registered patents. In addition, by implementing high accuracy placement of 50 microns at high speed, it allows placement of parts from the smallest 0402 chip to 254mm IC part. In the aspect of PCB applicability, it allows simultaneous feeding of 2 L460 x W250 PCBs, increasing actual productivity. It also supports the production of L610mm long board for display as an option.

**Features**

- Placement Speed: Chip 62K CPH (IPC9850)
- Applicable Parts: Max. 0020 ~ 154mm (Part height H=12mm)
- Placement Accuracy: ±50 µm (Part height H=12mm)
- Applicable PCBs: L460 x W250 x 2lane (standard) / L510 x W460 x 1lane (standard) / Max. L610 x W460 x 1lane

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**High Speed Flexible Mounter SM411F**

SM411F is a high-speed component placer for placing odd shaped parts, which is equipped with the platform (dual gantry) of SM411, which is a chip shooter, and the vision system of SM421. It can maximize the production speed of odd shaped parts by up to 150% ~ 200% compared to that of SM421. In addition, the accessories including side tray and automatic flux dipping unit were improved and the operational convenience was enhanced by installing frontal auxiliary tower lamps. It is also applicable to POP.

**Features**

- Placement Speed: Chip 38K CPH (IPC9850) / SOP 23K CPH (IPC9850) / QFP 5.5K CPH (IPC9850)
- Applicable Parts: Max. 0020 ~ 154mm (Part Height H=12mm)
- Placement Accuracy: ±50 µm / ±3 µm/Chip, ±10 µm / ±3 µm/QFP
- Applicable PCBs: L310 x W300 x 1lane (standard) / Max. L140 x W420 x 1lane

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**Line Efficiency Maximization**

- Odd shaped part production rate: Max. 150% ~ 200%

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**System Configuration Diagram**
**New Smart Platform**

**SM421**

**Advanced Flexible Mounter**

The SM421 is a high precision multi-functional chip shooter equipped with a high precision force control head based on the SM421 platform. It applies a linear scale to the X-Y axis to improve placement accuracy. Basically, it can be applied to various odd-shaped parts from 0402 fine chips to 57 x 42 mm IC parts, long connectors, bare chips and PIP insert parts. In addition, it also allows placement of special parts by providing gripper nozzles and supports the functions for part height adjustment of up to 28 mm, applicability to POP, lead lift-off check, and rear side reflection recognition.

**Features**

- **Placement Speed**: Chip 8.5K CPH (IPC9850) / QFP 4K CPH (IPC9850)
- **Applicable Parts**: Max. 0402 ~ 57 x 42mm (Part height H=28mm)
- **Placement Accuracy**: 30 μm/Chip, 60 μm/QFP
- **Applicable PCBs**: L460 x W420 x 1Lane (Standard) / Max. L740 x W460 x 1Lane

**Polygon Function**

The polygon recognition function was added to reinforce the applicability to odd shaped parts. The polygon recognition function, which extracts the part shape and recognizes the shape of the part entirely, provides optimal solution to the placement of irregular shaped SMD parts.

**Powerful Vision Algorithm**

The SM Series increases recognition accuracy by removing component image noise function and implementing an automatic teaching function. The flying camera helps recognize and compensate for components such as chip, TR, BGA and QFP as they are picked up and transferred to the placement point. Productivity and economic efficiency are improved with a new function that recognizes the position of the tape pocket from which the component is picked up.

- **Split Recognition for Large Component**
  - 55mm BGA (1.0mm Ball Pitch) / Connector, 72mm long in the diagonal direction / Using 45mm FOV stage camera
- **Real-Time Automatic Pickup Position Compensation**

**SM451**

**High Precision, Multi Function Component Placer**

The SM451 is a high precision multi-functional chip shooter equipped with a high precision force control head based on the SM451 platform. It applies a linear scale to the X-Y axis to improve placement accuracy. Basically, it can be applied to various odd-shaped parts from 0402 fine chips to 22 x 42 mm IC parts, long connectors, bare chips and PIP insert parts. In addition, it also allows placement of special parts by providing gripper nozzles and supports the functions for part height adjustment of up to 28 mm, applicability to POP, lead lift-off check, and rear side reflection recognition.

**Features**

- **Placement Speed**: Chip 9.5K CPH (IPC9850) / QFP 4K CPH (IPC9850)
- **Applicable Parts**: Max. 0402 ~ 55mm (Part height H=15mm)
- **Placement Accuracy**: 50 μm/Chip, 30 μm/QFP
- **Applicable PCBs**: L460 x W420 x 1Lane (Standard) / Max. L740 x W460 x 1Lane

**Reinforced Applicability to Odd Shaped Parts**

In order to reinforce the applicability to odd shaped parts, the function for lead lift-off check using gripper nozzle and laser sensor as well as the functions for rear side reflection recognition and PIN recognition for PIP insert part placement are added.

**High Precision Force Control System**

Allows the placement of parts requiring precision placement at the Z axis, such as PIP insert parts and flip chips, by applying the 2-axis force control system controlling the force widely from 0.1N to 50N.

**Applicable to Special Package**

- As equipment for special part placement, it is applicable to POP.

**New Head**

- 4 Spindles 45mm Pitch
New Smart Platform

From micro chips for mobile devices to large boards for display - SAMSUNG series machines provide optimum placement solutions to various needs of customers through the super-high speed On-The-Fly placement mechanism and the vision system with high reliability.

New Smart Platform

Longer Mean Time Between Assists (MTBA)
Top-quality accessories, such as non-stop tray feeders, increase overall system reliability and help significantly reduce amount of machine downtime.

Non-Stop Tray Feeder
JEDEC trays are separated into upper and lower magazines, each having 12 pallets and can operate independently. Tray components also can be reloaded while the machine is running, enabling consistent non-stop operation.

Side Tray Feeder
Entire JEDEC trays can be presented to the machine without any impact on PCB process width or available feeder slot locations, allowing for direct pick-up from tray and maximum efficiency of feeder space.

Non-Stop Tape Splicing
Provide a continuous, steady supply of available components quickly and easily using a component tape connecting splicer.

Automatic Pickup Position Adjustment
SM Series systems perform real-time recognition of a component as it is picked up from the component feeder. This feature provides the ability to automatically adjust the pickup position, ensuring that components are picked up consistently at the center, regardless of tape variations.

Quick Changeover

New Non-Stop Tape Feeder
Improved Accuracy
- High feeder base stability
- New mounting mechanism
- Two position-control pins at the front side
- Newly designed sprocket
Stable Indicating
- Built in cylinder
- Optimized pressure control within the cylinder
- Increased pick-up speeds with the index sensor
- Tape guide automatically compensates for changes in tape thickness
- Variable tape support for feeders accommodating tape widths of 12mm and higher

Easy to Use
- Swing type reel hanger (splicing verification)
- Easy feeder identification by applying a different color for each clamp 8mm (0402, 2p, 4p), Large Size (12~88mm)
- Ergonomic handle design
- Manual index switch (IT option)
- Power supply indication lamp illuminates when fixed by the clamp
- Tape guide lift prevention through the use of the control pin

Collective Feeder Replacement System - Docking Feeder Cart System
Samsung’s Docking Feeder Cart System is the key to rapid changeovers.
- A Docking Feeder Cart can be loaded offline, and then quickly rolled up to the machine where it is pneumatically clamped to the feeder base. Both the front and rear sides of the SM Series machines are designed to accommodate the Docking Feeder Cart System.
- Significantly reduce changeover time
- Replace carts without halting production
- Accommodates up to 56 8mm feeders per cart
- Automatically connects to feeder power and air supply
- Easily set the cart height using adjustable feet

Minimal Model Changes — Feeder placement Commonization
Register up to 120 8mm feeders on one machine simultaneously. Concurrent optimizer support prevents scheduling conflicts for multiple models to be arranged at the same time. The sliding-type feeder system permits the user to remove and replace feeders during operation without interrupting the overall system.

Changeover Report
The SM series can automatically generate a Job Change Order Sheet (feeder changeover report) while running production in order to minimize setup time. This report identifies only the feeders that need to be changed, eliminating the need to completely reload the machine.

Automatic Width Adjustment
The board transport system automatically adjusts to the precise board width in order to further facilitate quick changeover.

Common Nozzles
SM Series systems use nozzles that are common to other Samsung SMT assembly systems, allowing for interchangeability and optimal line balancing. With the increase in popularity of more delicate micro components, SM series systems have incorporated features to handle the demands of such products, specifically using nozzles with compliant mechanisms in order to prevent component damage.
- Ceramic Nozzle
- Bare Component Soft PAD Nozzle (Optional)

Table: Examples of Applying General Nozzles to Components

<table>
<thead>
<tr>
<th>General Nozzles</th>
<th>Examples Applying to Components</th>
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</thead>
<tbody>
<tr>
<td>NS425</td>
<td>NS525 (0402, 0603, 0805)</td>
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<tr>
<td>NS525</td>
<td>NS525 (0402, 0603, 0805)</td>
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<td>NS725</td>
<td>NS725 (0805, 1210, 1210)</td>
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<td>NS925</td>
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<tr>
<td>NS1025</td>
<td>NS1025 (1210, 1210, 1210)</td>
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</table>

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- Ceramic Nozzle
- Bare Component Soft PAD Nozzle (Optional)
New Smart Platform

SM Tape Feeder

Feeder Types/Size: Feeder Pitch(mm)
- 8mm (402): 2
- 8mm (2P): 2
- 8mm (4P): 4
- 12mm: 4, 8, 12
- 16mm: 4, 8, 12
- 24mm: 8, 12, 16, 20
- 32mm: 8, 12, 16, 20, 24, 32
- 48mm: 8, 12, 16, 20, 24, 32, 40
- 56mm: 8, 12, 16, 20, 24, 32, 40
- 72mm: 8, 12, 16, 20, 24, 32, 40
- 88mm: 8, 12, 16, 20, 24, 32, 40

Non-Stop Tray Feeders

- STF100D (Shuttle Tray Feeder)
  - Has upper and lower magazines with 12 pallets each, allowing the part tray to be replaced without stopping the chip mounter during part placement.
  - Large capacity tray feeder applicable for various odd shaped parts.
  - 24 trays with 24 stages (1 tray / 1 pallet)
  - 48 trays with 24 stages (2 trays / 1 pallet)

SMN Tape Feeder

SMM Tape Feeder

SM Feeder Storage Rack / Feeder Exchange JIG

- Minimize the space required to store unused or staged SM feeders.
- SU feeder storage case with 100 slots provides storage capacity for up to 100 SM feeders (based on 8mm feeder).
- SMN feeder storage case with 20 slots and the feeder Exchange JIG provides storage capacity for up to 20 SM feeders (based on 8mm feeder).
- Allows the user to replace tape reels in front of the machine, thus preventing feeder damage and improving work efficiency.

Splicing Tool Set

- Provide a continuous, steady supply of available components to increase productivity and reduce machine downtime.
- Manual Tape Splicing Tool
- Portable Tape Splicing Tool
- Performs the tape connecting function that guarantees high quality by moving the tool in front of the machine.

SM Single-Layer Tray Feeder

- One-touch mounting allows the tray to be easily inserted and removed from feeder base.
- Flat tray installation surface enables high speed pickup.
- Multiple orientations, based on tray dimensions.
- Applicable Trays: 12", 15.6 x 316mm, 200 x 316mm, 272 x 316mm
- Type: Single-layer tray feeders (136 x 316mm) with 2 trays

SM Feeder Calibration JIG

- Verify and adjust the feeder tape pocket position with the SM series Feeder Calibration JIG as part of a scheduled system maintenance program to ensure reliable component pickups.

SM Feeder Docking Cart

- Significantly reduces changeover time using the SM Series Docking Feeder Cart System. The system allows for replacing a complete feeder configuration in just minutes.
- Basic Set Configuration
  - Docking Feeder Base
  - Docking Cart

SM Storage Rack / Feeder Exchange JIG

- Minimize the space required to store unused or staged SM feeders.
- SU feeder storage case with 100 slots provides storage capacity for up to 100 SM feeders (based on 8mm feeder).
- SMN feeder storage case with 20 slots and the Feeder Exchange JIG provides storage capacity for up to 20 SM feeders (based on 8mm feeder).
- Allows the user to replace tape reels in front of the machine, thus preventing feeder damage and improving work efficiency.

SM Vibratory Feeder

- Adjustable frequency control
- Maximum of four lanes
- Applicable components - SIP, SOT, QFP, PLCC, connector, etc.

SM Feeder Calibration JIG

- Verify and adjust the feeder tape pocket position with the SM series Feeder Calibration JIG as part of a scheduled system maintenance program to ensure reliable component pickups.
from micro chips for mobile devices to large boards for display, the SM400 series machines provide optimum placement solutions to various needs of customers through the super-high speed On-The-Fly placement mechanism and the vision system with high reliability.

New Smart Platform

Intelligent Feeder System

The IT feeder system that provides an integrated part misplacement prevention function and automatic part recognition function automatically recognizes the feeder while exchanging the feeder to avoid in advance the possibility of the part loss due to incorrect placement and incorrect insertion or the mistake of the operator. It allows efficient material management by checking the remaining part quantity by storing the part information in the database.

Prevent Incorrect Component Placements

The component shortage warning feature prevents component shortages in real-time during machine operation. This feature minimizes machine downtime by notifying the operator to replace components in advance so as to restart production.

- Monitor remaining quantity for each component type
- Alert the user that a component shortage is imminent

Materials Management

Monitor real-time component inventory with barcode labels attached to the supply reels. Stock levels can be monitored once the reel is assigned to a SM IT Feeder. Monitoring component consumption using the common database allows the operator to replenish the system before the stock becomes depleted.

Low Component Supply Warning

- Verifies that the expected component feeders are indeed in the required locations. Verification is performed using barcode information that is obtained from the feeder and component when they are installed on the system. The operator is notified of any incorrectly mounted feeder or component before production begins.
- Stops operation after an error occurs if incorrect placement happens.
- Alerts the operator when corrective action is required.

Minimized Job Change Over Time (Feeder Preparation Time)

Preparation of the feeder using MFB file

- Indicates LED’s show the required feeders for job changeover, minimizing pre-preparation of the feeder.

Off-line Feeder Loading Station

Load components onto the SM IT feeders using offline stations that are connected to the shared database. Assign components to specific feeders to reduce changeover time, and further ensure accuracy using the built-in barcode system.

Load the feeder components prior to operation using the component changeover reports.

Lot Tracking System (Optional)

Lot Tracking, which is one of the options of IT Feeder System, traces and manages the history of the parts that were used when producing boards. It minimizes the range of recall by using the LOT Tracking history file. An external error occurs, and it helps to easily cope with an error that occurs while the machine is running. LOT Tracking data also can be integrated with the modules of TUIC Co., to manage the history in SMD IN-LINE.

Creation of Optimum On-Line Work Program for Chip Mounter

The CAD data, ASCII data, and the placement information in the program of the machine are managed by other companies. Component information can be changed accurately and easily by using Gerber files. In addition, the work program can be easily changed in the line by re-editing the actual line balance results of existing job files. Furthermore, it is possible to check the improvement result.

Production index management of line and productivity improvement

It is possible to monitor various production indexes and work status as well as detailed information of the machine and improve the operation rate and the defect rate of the line by providing the function that tracks an error when it occurs.

Real Time Line Status Monitoring

Single Line/Multi-Machine Monitoring

- Check the production status, operation rate and LOT status, and real-time operation of each machine in the line

Multi-Line/Multi-Machine Monitoring

- The production status and product quality status for each line can be checked in real time from remote locations.

EasyOLP Suite

The EasyOLP is a comprehensive management tool for the SMT line developed by Samsung Techwin. Since it performs job history management, converts various CAD or ASCII data into placement data for the chip mounter, and implements the line balance with optimum conditions between machines, the time required for programming can be minimized and the work program can be optimized to suit the environment of the machine, maximizing the productivity and increasing the production efficiency through machine monitoring.
<table>
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<tr>
<th>Model Name</th>
<th>SM431</th>
<th>SM431L</th>
<th>SM411</th>
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<td>510(L) x 420(W)</td>
<td>460(L) x 420(W)</td>
<td>400(L) x 420(W)</td>
</tr>
<tr>
<td>Power</td>
<td>4kW</td>
<td>4kW</td>
<td>4kW</td>
<td>4kW</td>
<td>4kW</td>
<td>4kW</td>
</tr>
<tr>
<td>Utility</td>
<td>360kg/min</td>
<td>360kg/min</td>
<td>360kg/min</td>
<td>360kg/min</td>
<td>360kg/min</td>
<td>360kg/min</td>
</tr>
<tr>
<td>Cooling</td>
<td>Approx. 1.5kW</td>
<td>Approx. 1.5kW</td>
<td>Approx. 1.5kW</td>
<td>Approx. 1.5kW</td>
<td>Approx. 1.5kW</td>
<td>Approx. 1.5kW</td>
</tr>
<tr>
<td>External Dimensions(h/mm)</td>
<td>1,430(L) x 630(W) x 1,400(H)</td>
<td>1,360(L) x 630(W) x 1,400(H)</td>
<td>1,480(L) x 460(W) x 1,400(H)</td>
<td>1,500(L) x 460(W) x 1,400(H)</td>
<td>1,500(L) x 460(W) x 1,400(H)</td>
<td></td>
</tr>
</tbody>
</table>