SAMSUNG

High Performance Automation for Electronic Manufacturing

FLEXIBLE. EFFICIENT. PRODUCTIVE.

Samsung factory certified sales, service, and support exclusively provided to North America by SAMSUNG C&T Automation, Inc..

Why Samsung

I. Captive Technology

a. *Global OEM - building electronics for industrial, military, medical, commercial, and consumer applications in rigorous, non-stop production environments worldwide*

b. *Turn-key line solutions - printer, placement, reflow, and board-handling equipment, complete with factory service and support from beginning to end of line, complete with overall process expertise*

c. *Subsystems - machine vision and intelligent SMART (Simple + Modular + Available + Reliable + Throughput) technologies*

II. Scalable Platform

a. *Chip, flex, and odd-form-capable platforms - for dynamic productivity, control and efficiency; all built on a common-family platform*

b. *Compatibility and modularity - with legacy technology , including feeders, nozzles and program portability*

III. Support Synergy

a. *Samsung's strategic infrastructure - for R&D, manufacturing, applications support and logistics to locations worldwide*

b. *Sales, service, and parts - handled responsively 24/7 by Samsung-Certified Expert Technical Services Engineers at locations throughout North America*

c. *Demonstration and training - available at numerous facilities throughout North America*

IV. Return On Investment

a. *Low cost of ownership - with minimum maintenance requirements, comprehensive warranty, free technical support, free lifetime software upgrades and intuitive user-friendly operator interfaces*

b. *Optimum utilization - with advanced software tools, quick-change feeder carts, setup verification and the industry's first fully automatic loading tape feeder*

History of Samsung Placement Technology

1989	1995	1998	2000	2005	2007	Future
Launched inline sys. business	*Intro CP30*	*Intro CP40/50*	*Intro CP45/63*	*Intro SM310/320*	*Intro SM411/421*	*Flexibility & Performance*

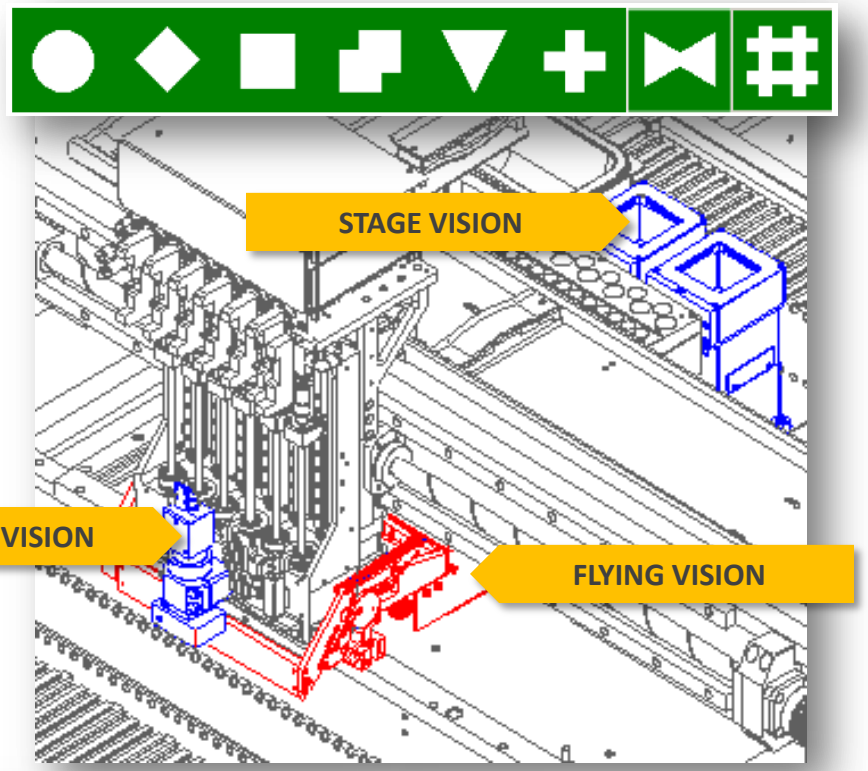
CP Series ⟶ SM Series

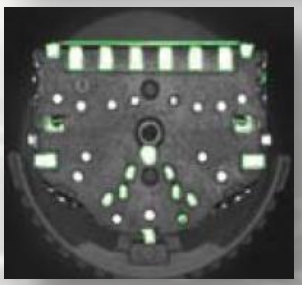
- *Tried & true operation building Samsung electronics*
- *Outstanding reliability & robustness of design*
- *High-efficiency chip shooting & flexibility for superior multifunctional capability*
- *Flying vision system for next generation technology*

- *Evolved from CP63/45 platforms*
- *Greater flexibility & efficiency*
- *Increased speed, accuracy, component handling range, & feeder capacity*
- *XL board handling, intelligent system availability*

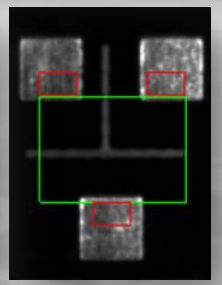
Full Vision Recognition of Components and PCBs

Samsung utilizes upward looking vision inspection of all parts on all spindles; downward looking vision inspection of fiducials including implied (holes, pads, silkscreen, etc.). Each placement spindle utilizes an integrated HD/mega-pixel head cameras with integrated high performance multi-stage illumination for high resolution full vision inspection and alignment of 01005 chips to components as large are 23mm(L) x 23mm(W) x 15mm(H). For components requiring a larger field of view, Samsung's stage (or stationary) camera is used for large ICs and/or SMT connectors up to 75mm in length; polygon recognition can also be utilized when auto-teaching odd-form components is required. Samsung's fiducial recognition system is equally powerful with integrated multi-stage illumination for reliable recognition of various fiducial types, and placement angle preview capability for look-down drawing of component outlines including leads for pre-placement verification.





POLOYGON RECOGNITION



PLACEMENT ANGLE PREVIEW

General Specs of Samsung Placement Technology

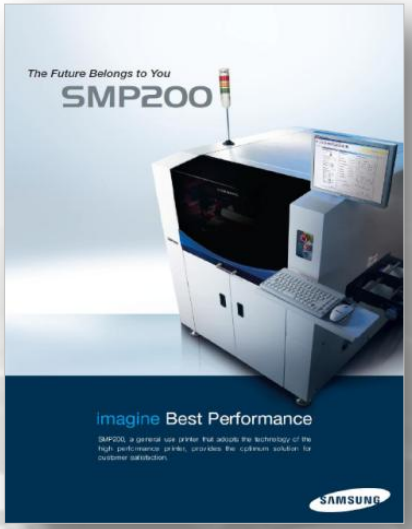
Platform	SM471	SM481	SM482	SM451
Application	*Chip mounting*	*Chip mounting, flex mounting (option)*	*Flex. mounting*	*Odd-form, adv. packaging*
Spindles x Gantries	*10 x 2*	*10 x 1*	*6x 1*	*4 x 1*
Vision System(s)	*Flying (HD/megapixel)*	*Flying (HD/megapixel)*	*Flying + Stage (HD/megapixel)*	*Flying + Stage (HD/megapixel)*
Component Range	*01005 to .55" (0402 to 14mm)*	*01005 to 1.65"" (0402 to 42mm)*	*01005 to 2.95" (0402 to 75mm)*	*01005 to 3.9" (0402 to 100mm)*
Part Height	*.47" (12mm)*	*.59" (15mm)*	*.59" (15mm)*	*1.1" (28mm)*
Feeder Capacity	*120, 112*	*120, 112*	*120, 112*	*120, 112*
Cph (IPC)	*75,000 (59k)*	*39,000 (32k)*	*28,000 (22k)*	*(8,500)*
Accuracy @ 3σ	*±0.00196" (±0.050mm)*	*±0.00118" (±0.030mm)*	*±0.00118" (±0.030mm)*	*±0.00098" (±0.025mm)*
Options	*Docking Carts, IT, LB*	*Docking Carts, IT, LB, XLB, Stage cam*	*Docking Carts, IT, XLB*	*Docking Carts, IT, LB, XLB, Grippers*
Dimensions (LxW)	*5.41' x 5.54' (1650mm x 1690mm)*	*5.41' x 5.54' (1650mm x 1690mm)*	*5.41' x 5.54' (1650mm x 1690mm)*	*5.41' x 5.54' (1650mm x 1690mm)*
Power & Air	*220V/3ph/20a 80 psi @ 8.5 cfm*	*220V/3ph/20a 80 psi @ 8.5 cfm*	*220V/3ph/20a 80 psi @ 8.5 cfm*	*220V/3ph/20a 80 psi @ 8.5 cfm*

Key Features of SAMSUNG Placement Technology

- ✓ *Scalable platform technology (chip, flex, odd-form)*
- ✓ *01005 chip to 75mm component range*
- ✓ *20-50 micron placement accuracy*
- ✓ *16.5k-75k placement speed*
- ✓ *120-8mm feeder capacity*
- ✓ *Strip tape handling options (Auto Loading Feeder)*
- ✓ *Various stick/tube feeding options (Air Stick)*
- ✓ *Various tray feeding option (Side Tray)*
- ✓ *Auto Z-teach capability*
- ✓ *Package-On-Package capability*
- ✓ *15mm-28mm component height capability*
- ✓ *Ultra fine pitch capability*
- ✓ *BGA ball recognition capability*
- ✓ *QFN recognition capability*
- ✓ *Fiducial recognition of implied fiducials*
- ✓ *Automatic nozzle changer included*
- ✓ *High durability compliant nozzles included*
- ✓ *Front & rear operator consoles included*
- ✓ *Quick loading tape feeders (3-30 seconds)*
- ✓ *Deep pocket feeders for tall parts*
- ✓ *Polygon recognition for odd-forms*
- ✓ *Placement angle preview included*
- ✓ *Maintenance manger included*
- ✓ *Offline programming with optimizer*
- ✓ *Generic part library of 1,150 components*
- ✓ *Production monitoring tools included*
- ✓ *Virtually built board viewer available*
- ✓ *Free software upgrades for life*
- ✓ *24/7 service and support included*
- ✓ *Installation with training included*
- ✓ *Comprehensive warranty included*
- ✓ *Payment terms with leasing available*

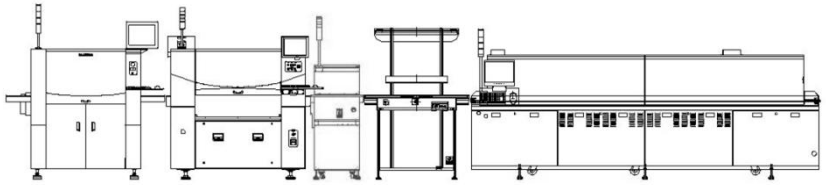
Best in Class SMT Assembly Line Solutions

Samsung provides synergized SMT assembly solutions combined with world-class service & support throughout North America. Solutions include state of the art printing, placement, reflow, and board handling technologies to achieve high quality and price-performance without compromising flexibility and growth path on demand. All systems include installation, training, warranty, 24/7 technical phone support, next business day onsite support, next business day shipment of emergency spare parts, and free MMI software upgrades for life on select gear.



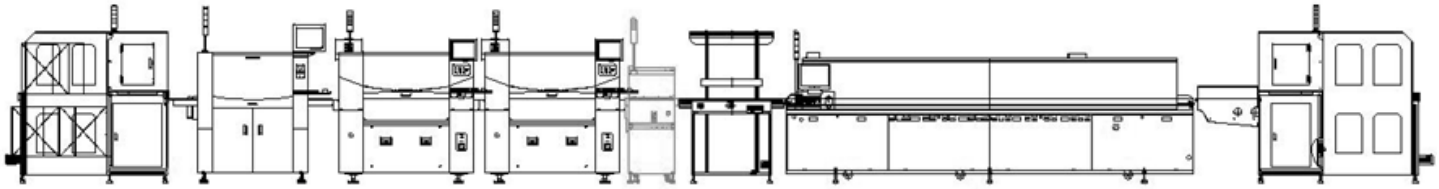
Sample Samsung SMT Assembly Line Solutions

Flexible line for quick-turn prototyping:



Includes printer + flex mounter + side tray + worktable + reflow. Estimated line length is 9.949m (32.65ft).

Flexible line for high mix production:



Includes magazine/line loader + printer + flex mounter + flex mounter + side tray + worktable + reflow + magazine/line unloader. Estimated line length is 16.229m (53.25ft).

Flexible line for double-sided volume production:

Includes combination vacuum unstacker & magazine/line loader + inverter + printer + chip shooter + flex mounter + side tray + worktable + reflow + magazine/line unloader. Estimated line length is 17.746m (58.22ft).

Thank you for considering SAMSUNG SMT assembly solutions.
Contact jonny.n@samsung.com or call (919) 606-3707 for additional assistance.

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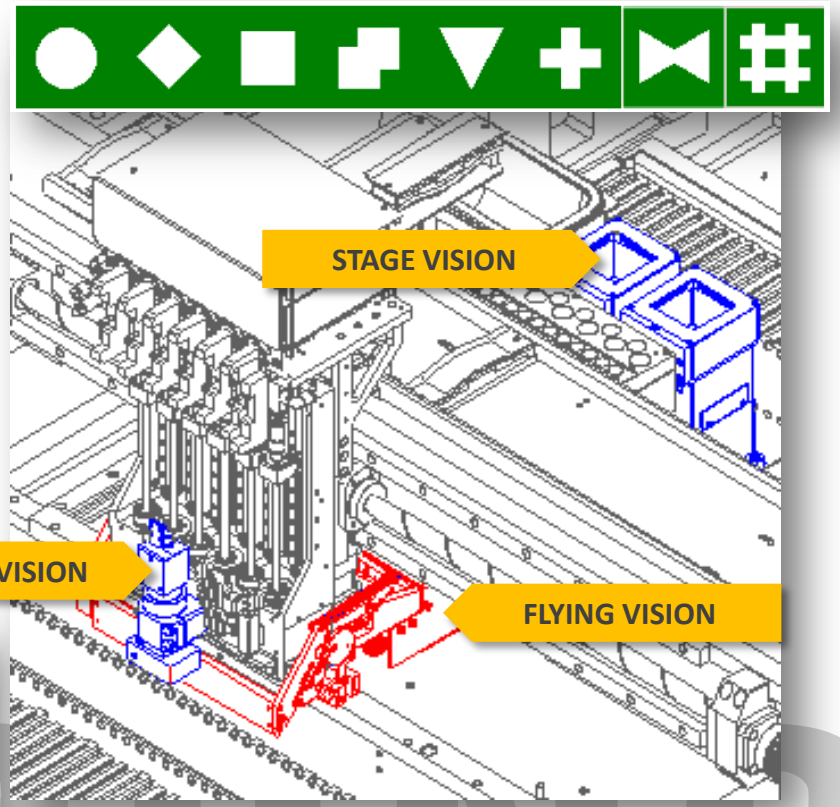
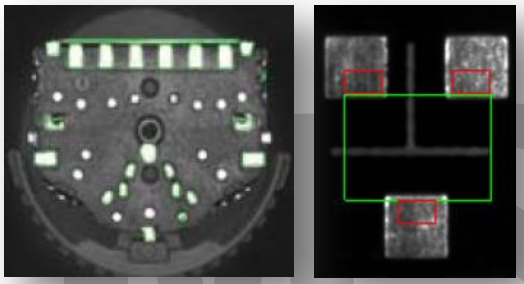
Vision Recognition of Components and PCB Substrates

- SAMSUNG utilizes upward looking vision inspection of all parts on all spindles; downward looking vision inspection of fiducials including implied (holes, pads, silkscreen, etc.)

Each placement spindle utilizes an integrated HD/mega-pixel head camera (six per head) with integrated high performance multi-stage illumination for high resolution vision inspection and alignment of 01005 chips to components as large are 23mm(L) x 23mm(W) x 15mm(H). For components requiring a larger field of view, Samsung's stage (or stationary) camera is used for large ICs and/or SMT connectors up to 72mm in length; polygon recognition can also be utilized when auto-teaching odd-form components is required. Samsung's fiducial recognition system is equally powerful with integrated multi-stage illumination for reliable recognition of various fiducial types, and placement angle preview capability for look-down drawing of component outlines including leads for pre-placement verification.

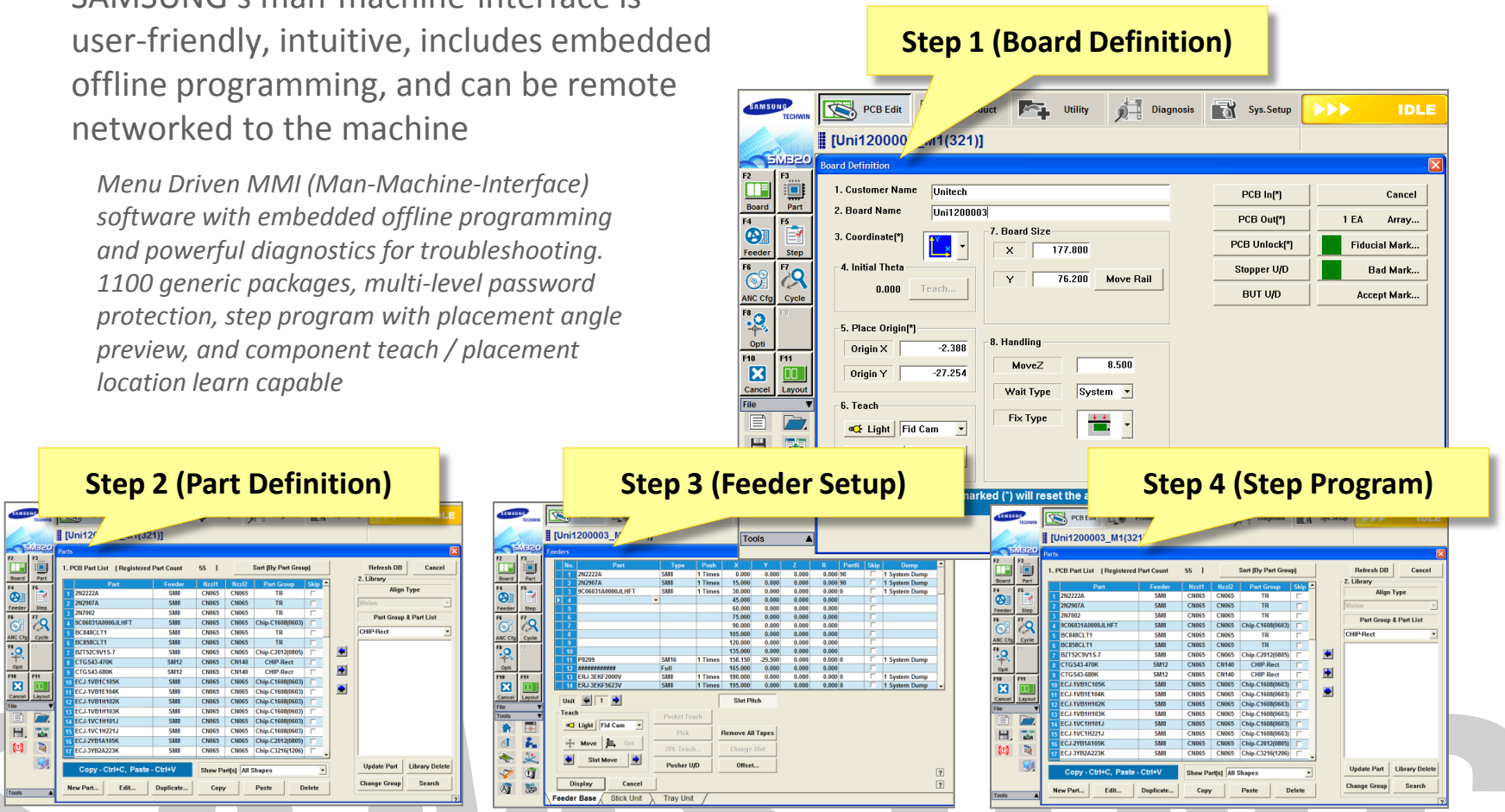




Programming Efficiency and Flexibility

- SAMSUNG's man-machine-interface is user-friendly, intuitive, includes embedded offline programming, and can be remote networked to the machine

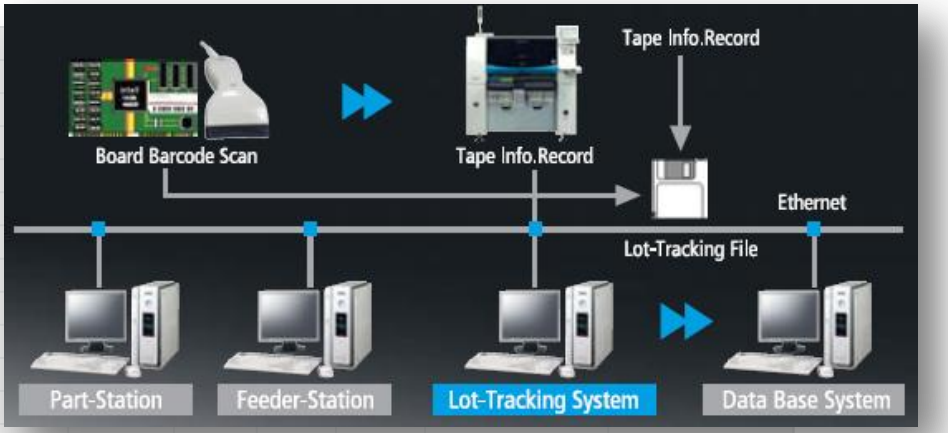
  Menu Driven MMI (Man-Machine-Interface) software with embedded offline programming and powerful diagnostics for troubleshooting. 1100 generic packages, multi-level password protection, step program with placement angle preview, and component teach / placement location learn capable



Lot Traceability

- SAMSUNG's advanced IT/Traceability module allows the customer to know what components from what lot number are placed on what board at what date and time

  Samsung accomplishes this by issuing a unique bar code for each reel of parts. This bar code identifies a single reel throughout its life in the factory. When the lot tracking machine brings a new board in to be built it reads the serial number from a 1D or 2D bar code on the board, then it starts a lot tracking file for that board. The system records the start time, start date, operator name, and program version used to create that board. As parts are placed on the board, the system records the quantity and the reel code the part is used from. At the completion of the build the system records the stop time and date, then archives the .TRK file for future reference.

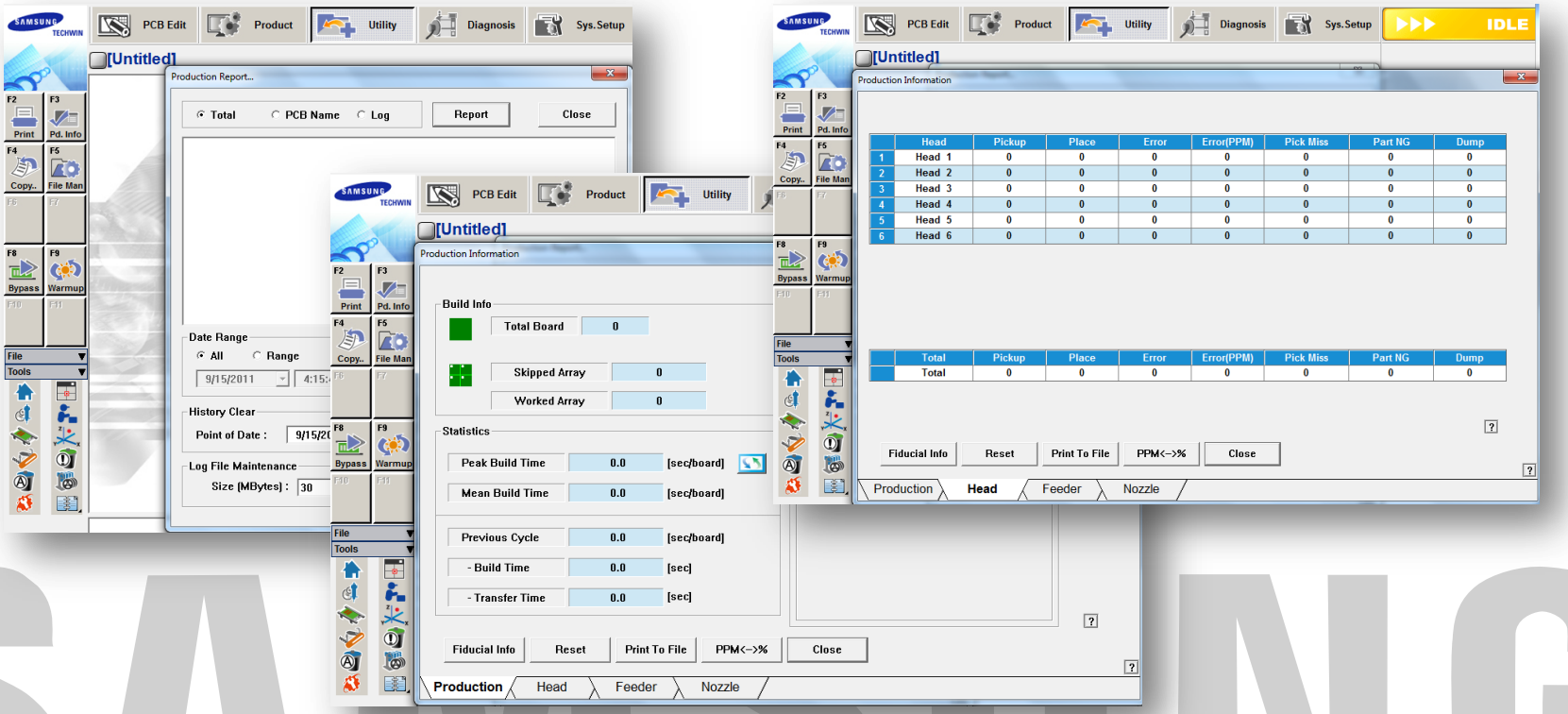


BOARD_NUMBER=061129110251-01									
MACHINE_CODE=IT_TEST									
PCB_FILE_NAME=C:\Mark5\PCB\PCB008_M1(320).OPT									
OPERATOR=DTITEST									
START_TIME=11/29/2006 11:18:18									
END_TIME=11/29/2006 11:21:07									
ORDERNAME=PCB008-11-29-06									
T1=ENABLED									
T2=DISABLED									
T3=DISABLED									
T4=DISABLED									
DESCRIPTION=									
[DATA]									
PART_NAME	FID	SLOT_NO	LOT_NUMBER	QTY	VCODE	VPART	VNAME	FEEDER_TIME	FEEDER_CHANGE
SO14GTR-3.8mm	ai-16a-00236-f1	F-30	061106164214-01	4				11/29/2006 11:18	0
SOT143-TR	AI-08D-01202-EC	F-32	061106164747-01	4				11/29/2006 11:18	0
0201SMR-PA	AI-08C-00679-E9	F-34	061106173951-01	156				11/29/2006 11:18	0
0402SMR-PA	AI-08C-00621-E9	F-36	061106174152-01	52				11/29/2006 11:18	0
0603SMR-PA	AI-08D-01203-EC	F-38	061106165630-01	42				11/29/2006 11:18	0
0805SMR-PL	AI-08D-01205-EC	F-40	061106161003-01	36				11/29/2006 11:18	0
END									

Production Analysis Tools with an Interface to SPC Quality Systems

- SAMSUNG software provides performance monitoring for any board or group of boards for any period of time including speeds, performance, operation status, and defects by head, feeder, nozzle

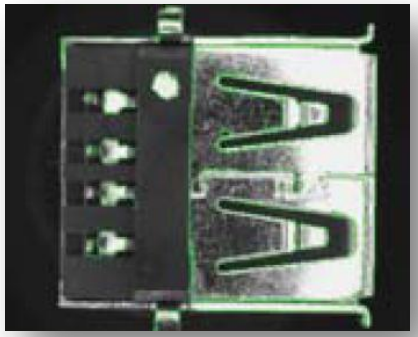
  All information is exportable for use with third party SPC packages

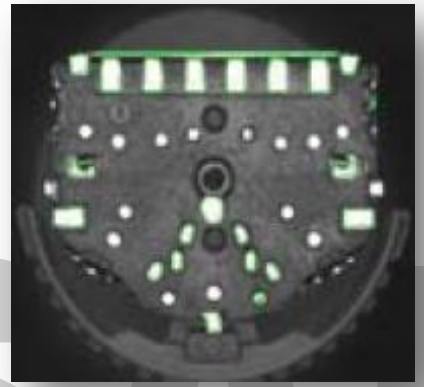


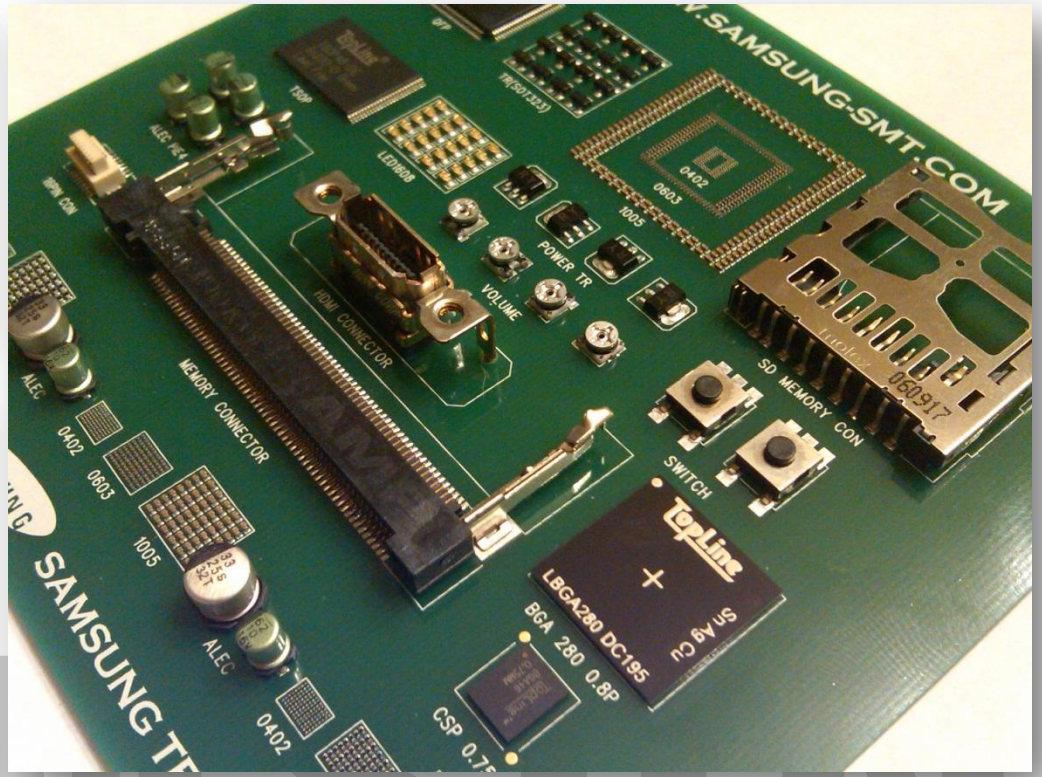
Odd Shape Component Placement Capability

- SAMSUNG's polygon recognition capability can auto-teach odd shape components for extracting part information to recognize a component entirely

  System can process up to 72mm length SMT connectors and components as tall as 15mm



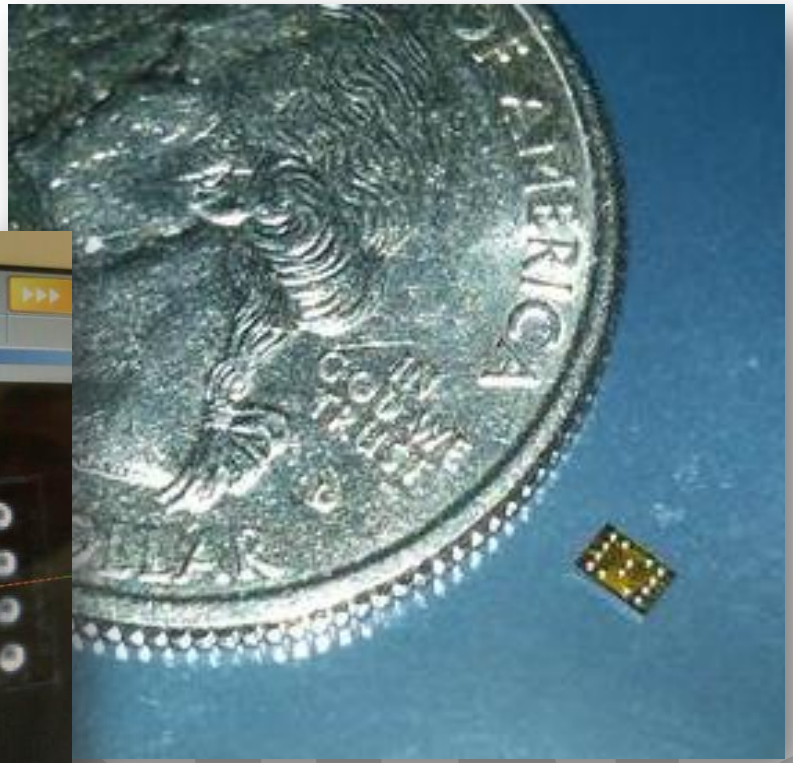


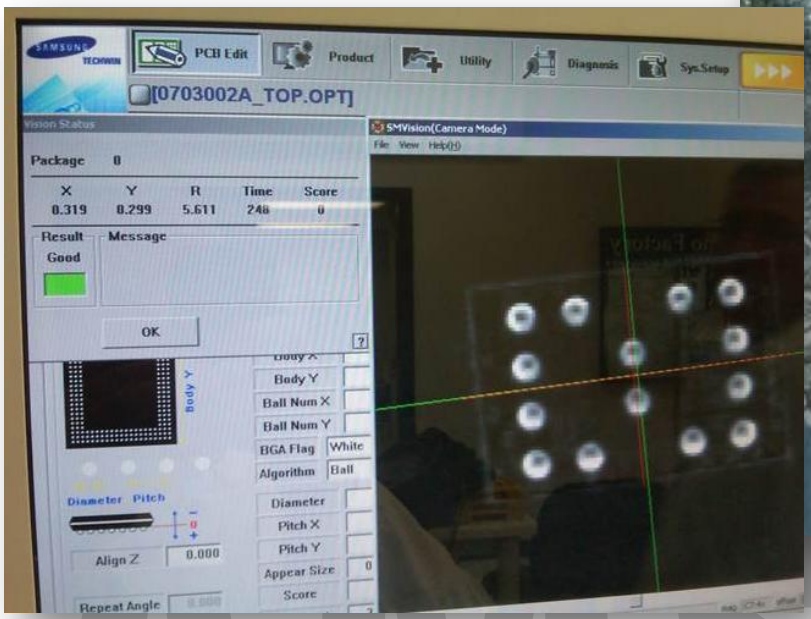


Ball Size & Ball Pitch

- Successfully inspected, dip fluxed, and placed a ball size of .005” (.125mm) @ a ball pitch of .013” (.35mm)

Inspection result achieved with standard SM421 head camera. Camera type is HD/megapixel 25mm FOV with high performance multi-stage illumination capability (outer, side, combination)

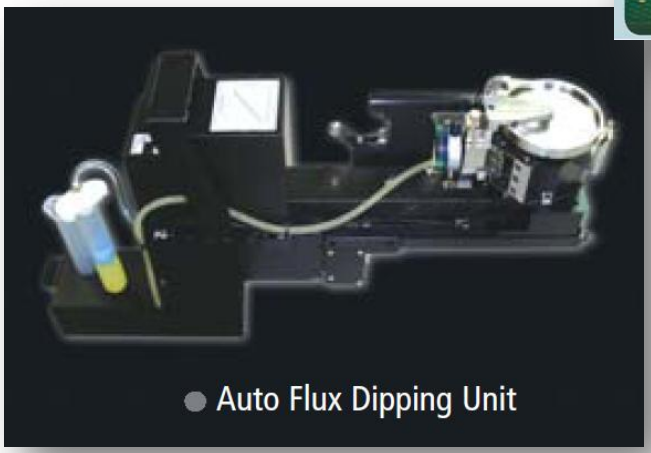


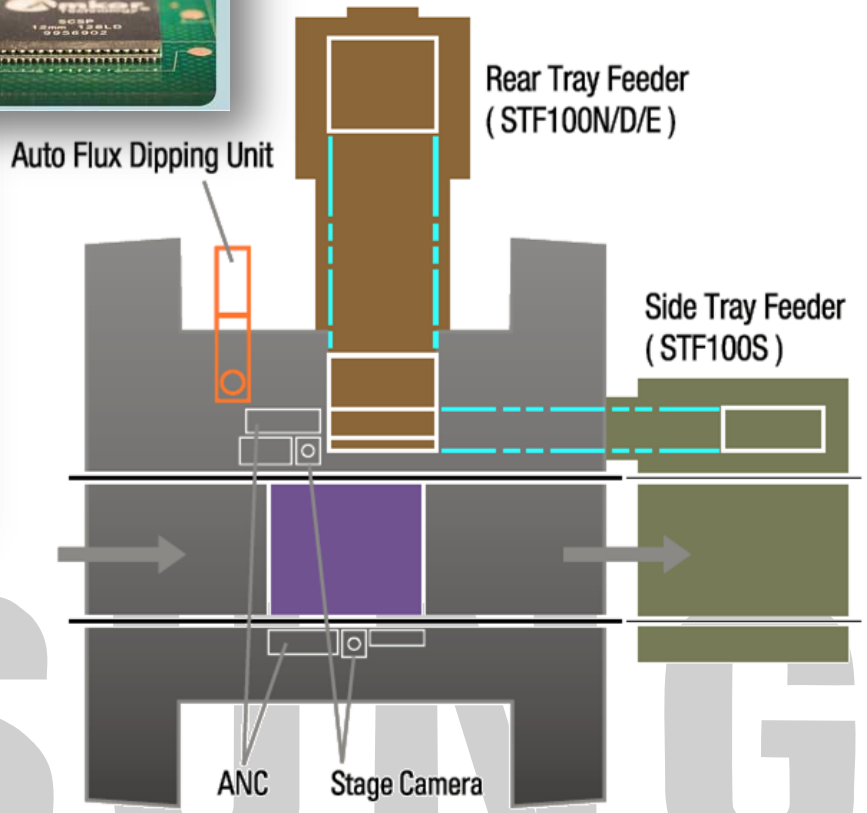


Package-On-Package Process Capability

- **All SM4x Machines** are PoP capable

  Flexible Programming for multi-level stacking; Precision Nozzles with built-in compliance; soft-touch processing; Pre & Post-flux Vision Inspection for optimum placement accuracy and repeatability; Reliable Feeding Solutions for tape & trays

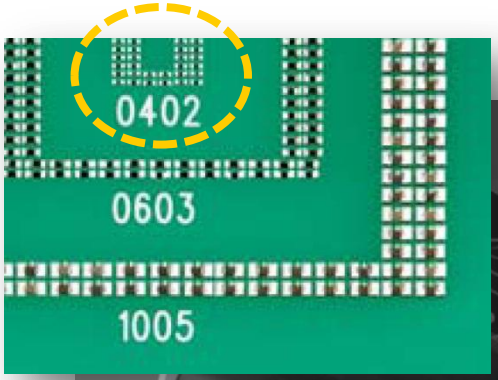


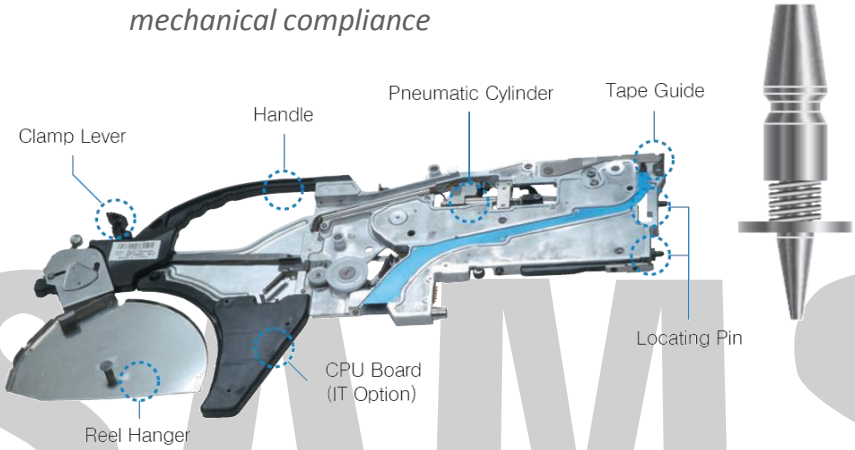


01005 Capability (10 mils x 5 mils = 0402 metric)

- SAMSUNG's HD (megapixel) vision systems allow for vision processing down to 01005 chips with each spindle capable of precision placement accuracy down to 30 microns

  In addition, Samsung feeders, machine software and nozzles optimize 01005 pick reliability and placement repeatability. Samsung tape feeders are virtually maintenance-free; machine software can automatically compensate for any center-pocket pick position error while automatically calibrating itself during the production; and nozzles are high-durability ceramic with built-in mechanical compliance

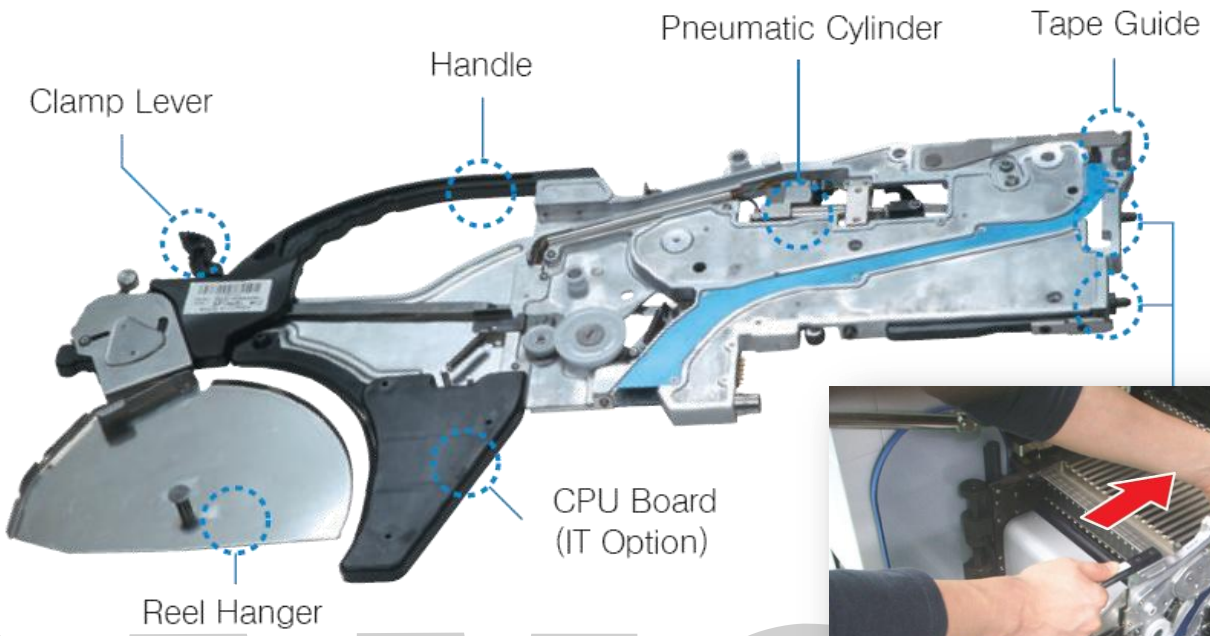


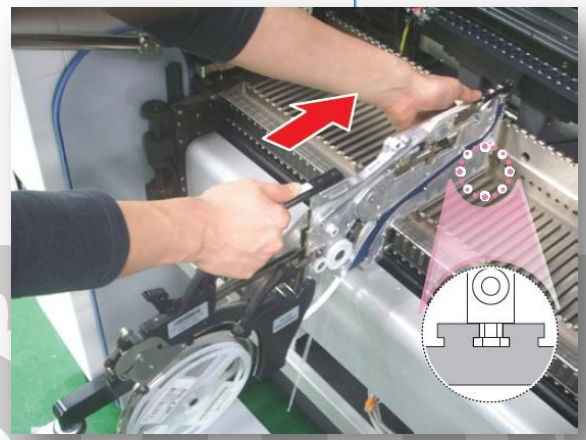


Tape Feeder Capabilities

- SAMSUNG tape feeder technology is virtually maintenance free and highly reliable

  Quick loading in 20-30 seconds per part number; slide in/out design; electro-pneumatic technology; available in 8mm to 72mm; deep pocket capability for tall electrolytic capacitors; retractable reel hanger for setup verification and accessibility



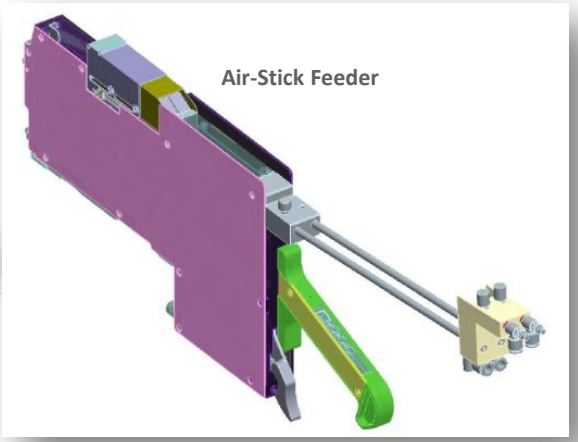


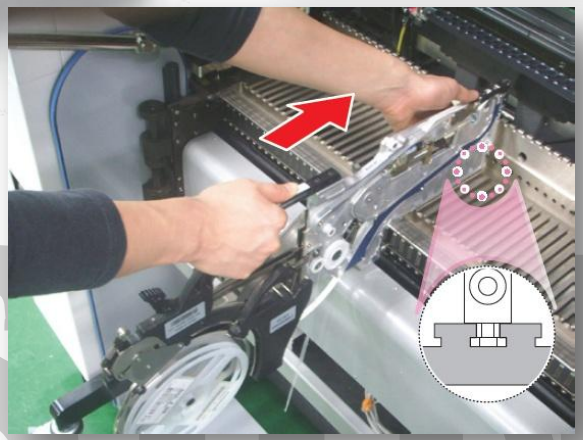
Slide-in/out design w/dual locator pins

Stick/Tube Feeder Capabilities

- SAMSUNG offers various solutions for stick/tube fed parts including vibratory or air-stick technology for balancing flexibility, capacity, and performance

All Samsung stick/tube feeding technology slides quickly and easily in/out of feeder bases and includes integrated connections (no exposed cabling). Auto-Z teach capability of machine facilitates quick and easy setup





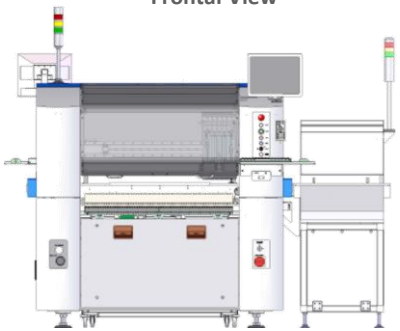
Slide-in/out design

Side Tray Feeder Capabilities

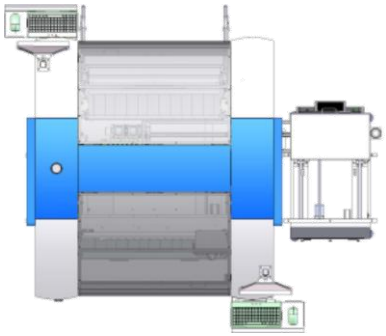
- SAMSUNG's side tray feeder automatically handles up to 20 trays without sacrificing feeder capacity, standard board size, or front & rear docking feeder cart configuration

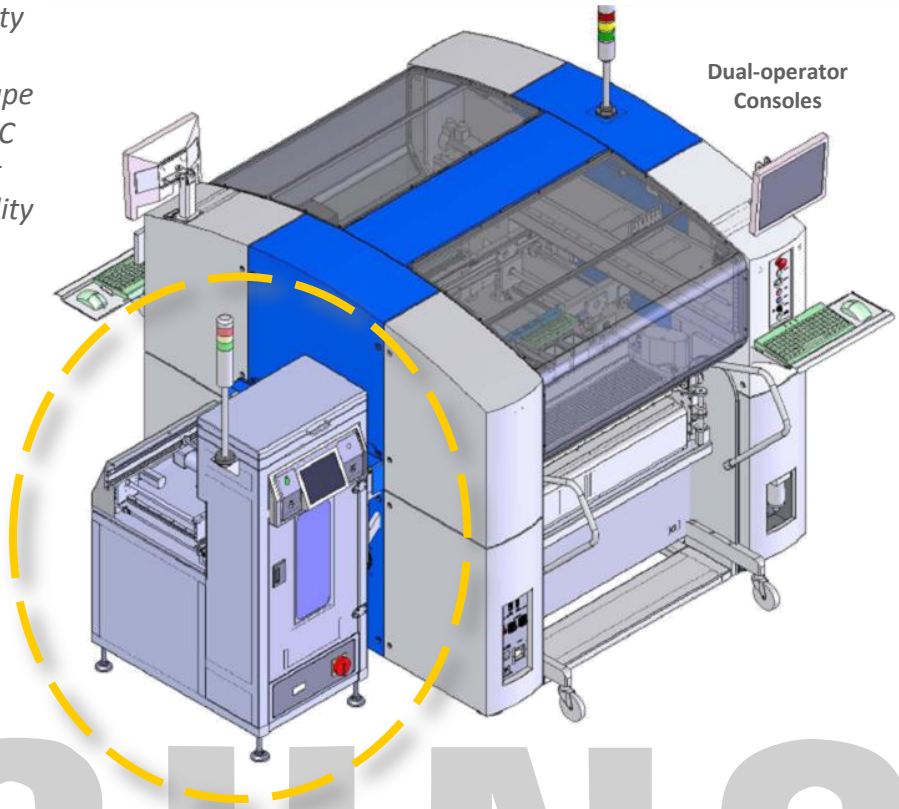
Non-stop operation enables the operator to replenish empty trays without interrupting machine production. Direct tray feeding with pre-fetch function, part return to tray, strip tape handling, cartridge loading, integrated buffer conveyor, PLC controlled, and the auto-Z teach function of the placement machine maximize overall system performance and flexibility for any mix, any volume production environment.

Frontal View



Top-down View

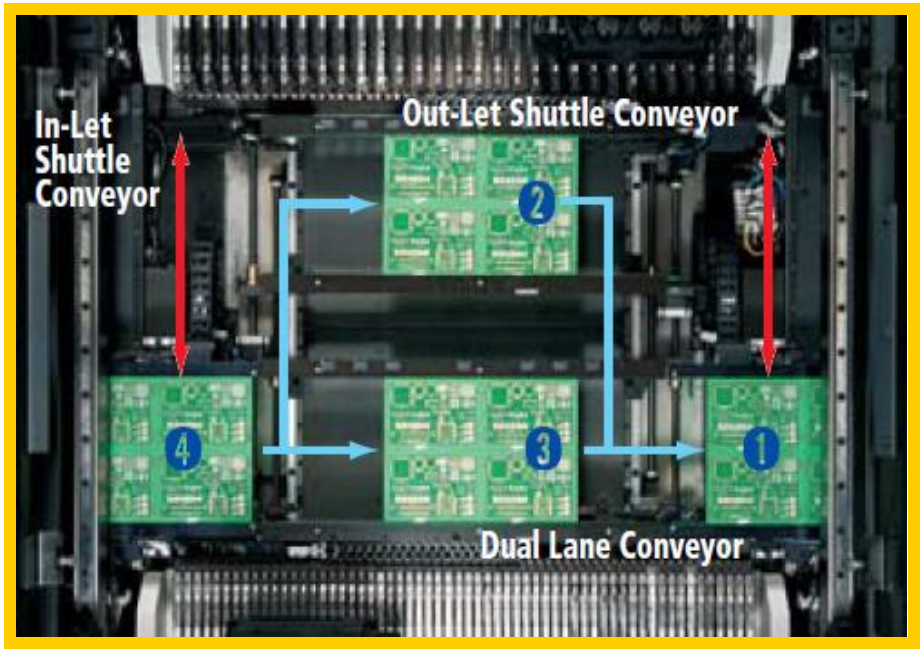




Dual-lane Conveyor System

Mixed Mode Processing for Maximum Efficiency & Flexibility

- PCB loading time & fidicual reading time “ZERO” with shuttle-type dual conveyor
- Process “TWO” 510mm (460mm SM431) x 250mm boards simultaneously, maintains 3-stage conveyor for efficient board transport
- Available on SM411 & SM431 chip shooters



Join Mode

Common use of front and rear feeders (board width less than 250mm)

Single Mode

For production of medium and large boards (greater than 250mm in width)

Twin Mode

Individual placement on front and rear sides (board width less than 250mm)

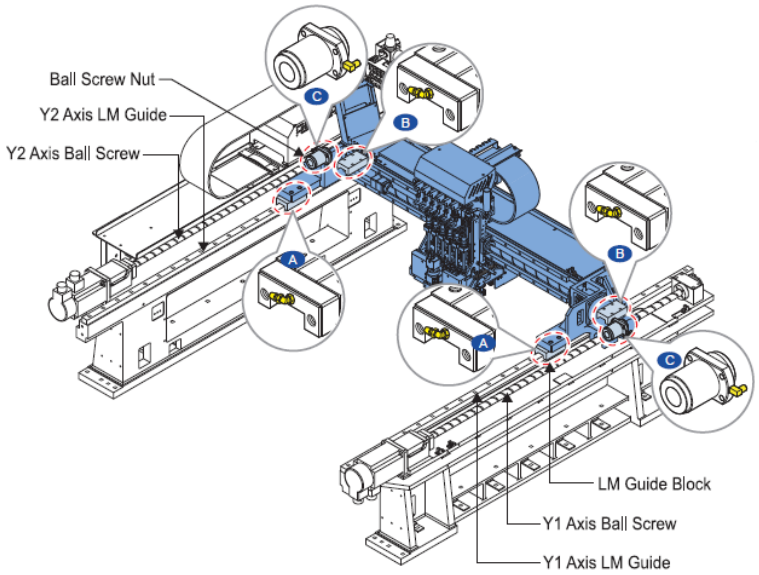
Maintenance

General Requirements & Consumables

- **<u>Less than 8 hours time & less than $800 in consumables</u>** - based on single shift operation to perform basic housekeeping and lubrication is less than 8 hours annually; estimated total cost of basic consumables is less than $800 annually. Basic calibration if/when necessary takes less than 30 minutes and all tools are included with the machine.

Check-up List for Maintenance

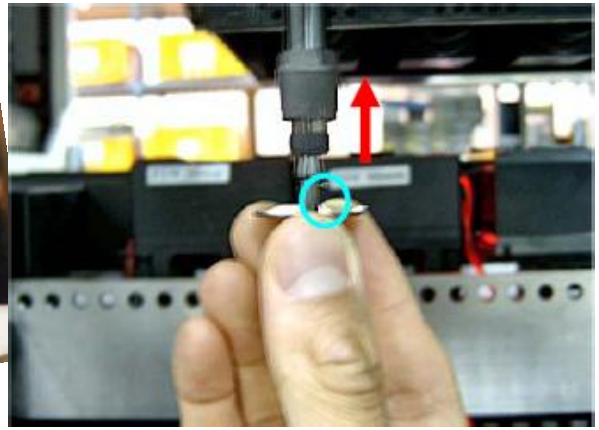
Check-up List			Reference to (Maintenance Reference)	Period
Major Category	Sub Category	Check Item		
Head	L/M Guide	Applying grease and cleaning	4.2.1	4 Monthly
	Ball Spline	Applying grease and cleaning	4.2.1	3 Monthly
	Mirror Cam	Applying grease and cleaning	4.2.1	3 Monthly
	Vacuum Filter/Spindle	Replacement and cleaning	3.2.2	2 Monthly
	Nozzle Holder Tube	The damage of the tube	3.2.1	2 Monthly
	Fly Camera Lens	Cleaning	3.1.2	Weekly
	Flying Vision Mirror	Cleaning	3.1.2	Weekly
	Nozzle Holder	Damaged or bent.	3.1.1	Weekly
	Nozzle	Lubrication and cleaning	2.1	Daily
X-Y Frame	L/M Guide & Ball Screw	The lubrication, applying grease, and cleaning	4.2.2.1	2 Monthly
Conveyor	L/M Guide	Applying grease and cleaning	4.2.3.1	6 Monthly
	Lead Screw	Applying grease and cleaning	4.2.3.1	2 Monthly
	Stopper End	the wear	3.2.4.5	Monthly
	Cylinder	The operation status	3.2.4.5	Monthly
	Belt	Tension and the wear	3.2.4.1~3.2.4.2	Monthly
	Sensor	Cleaning	3.2.4.3~3.2.4.4	Monthly
ANC	Cylinder	The operation status	3.2.4.5	Monthly
BUT	Cylinder	The operation status	3.2.4.5	Monthly
Feeder Station	Upper Plate	Cleaning	2.2	Daily
Stage Camera	Cover Glass	Cleaning	2.3.1	Daily
	Camera Lens	Cleaning	2.3.2	Daily
Air	Head and Machine main body	The air leakage	3.2.3	Monthly
	Air Filter & Auto Drain	Replacement and cleaning	3.2.3.2	Monthly
	Setting air pressure	Air pressure status	3.2.3.1	Monthly
Cooling Fan	PC Fan	The operation status and cleaning	3.2.5.1	Monthly
	Cover Fan	The operation status and cleaning	3.2.5.1	Weekly
other	Part of Panel Switch	The operation status	3.2.5	Monthly
	Door Switch	The operation status	3.2.5	Monthly
	Monitor/Mouse/Keyboard	The operation status	3.2.5	Monthly
	Tower Lamp	The operation status	3.2.5	Monthly
	Relay	The operation status	3.2.5	Monthly
	Fuse	The operation status	3.2.5	Monthly

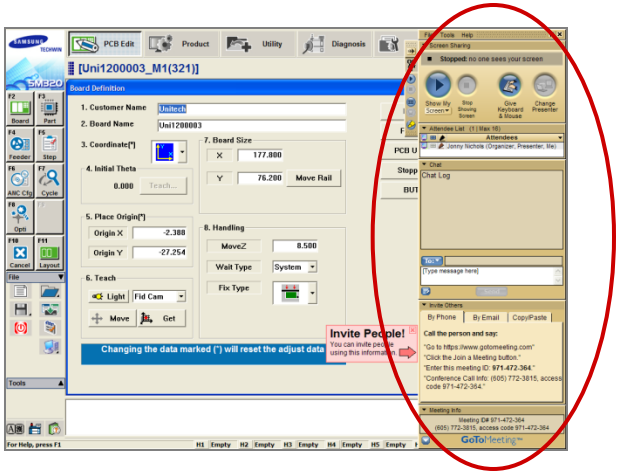


Service & Support

Phone, Onsite, Online

- **24/7 PHONE SUPPORT** available to registered users; next business day onsite support and shipment of emergency spare parts
- **4-DAYS ONSITE TRAINING** with installation (basic operator, programming, maintenance); advanced training available
- **FREE MMI SOFTWARE UPGRADES FOR LIFE** to original owners
- **FULL FACTORY WARRANTY** includes immediate assistance and covers parts (2 years), labor, and travel/living expenses (excludes consumables)
- **EXTENDED SERVICE AGREEMENTS** available for parts only or all inclusive





Docking Feeder Carts

Special Features

Quick Changeover + High Efficiency

Up to 112-8mm positions per machine (56 per cart); takes approximately 5 minutes per machine; front & backside docking carts can be used with external side tray handler

Offline Setup Verification

IT system checks feeder position & qty of parts at feeder station and machine

Convenient & Maneuverable

Ergonomic handles, large base & side casters enhance maneuverability during mount/dismount operation

High Reliability

Heavy-duty steel base & frame; no need to verify center pocket pick position; accurate, repeatable, robust clamping mechanism that pneumatically LIFTS base into position

Customer Testimonial

Re: Changeover Speed & Efficiency

Our job **changeover times are approx 5-10 minutes for both machines on both front and rear bases.** The SM320 line is our high-mix low/med volume line.

We are doing 100% setups on the extra feeder carts offline. Most of our builds have between **85-120 line items** to changeover and some are using multiple feeders for gang-pick speed. I'd say on average it's in the 110 feeder range, from 8mms to 72mms.

Once we have the feeder carts locked in, it's just a matter of adjusting the rail widths and pressing start to run.

We looked at the efficiency in SMT based on the start of one job to the start of the next job (including changeover time). On average we are **saving about 2 hours per job using the SM320's** based on the Panasonic & Quad machines we still have on the other lines.

The only other piece of information based on time would be how long to teardown and setup a feeder. I needed to give our accounting department a labor cost for setups in SMT; we are using a 2 minute labor value per line item for this. This is an average for the 3 different manufactures feeders and also verbal verification for the Panasonic and Quad once we setup the machine. With the SM320's we had an average of **70 seconds to uninstall the feeder, load the part, and scan the new part into the feeder** and there is no verbal verification needed since we have the IT system.

- Mike Antinori, Bel Power Inc. | Cell (508) 314-1515 | mike.antinori@gmail.com

Feeder Storage Rack

Special Features

Protects Feeder Investment

Slotted shelves w/locking pin holes to ensure stable storage when stationary or mobile; welded frame for maximum strength & rigidity; broad base for enhanced stability

High Capacity

100 slots for maximizing storage; multi-level shelving for storage efficiency

Ergonomic & Convenient

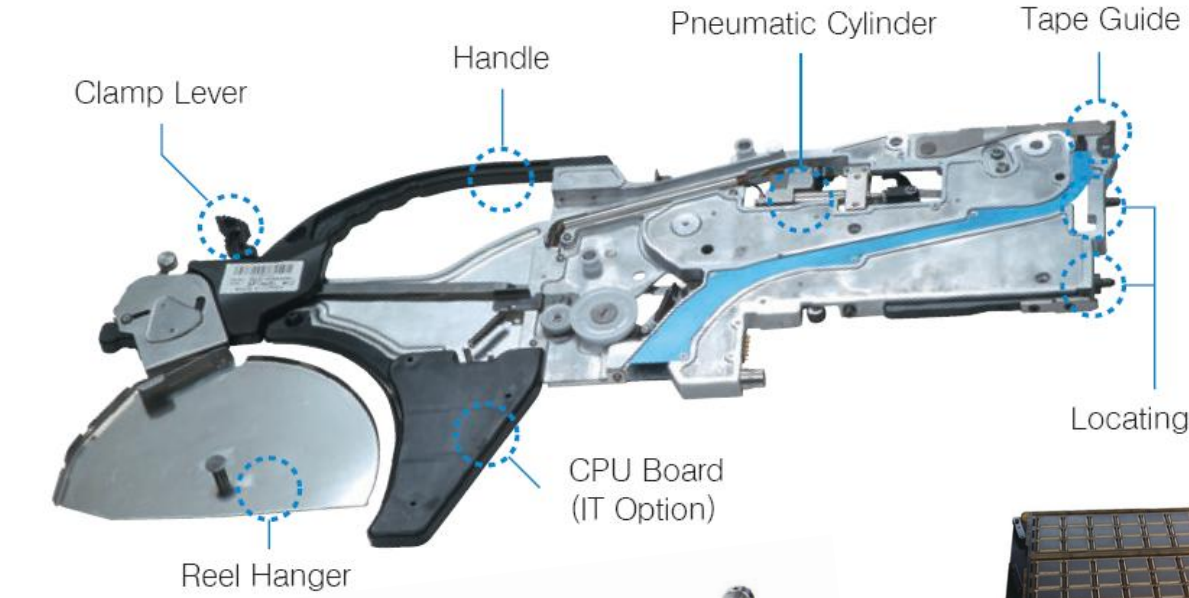
Welded handles for solid grip & easy of movement; stacked shelving minimizes footprint; large casters for ease of movement

Additional Functionality

Offline setup tool for job changeover assistance; color-coordinated with SM series equipment; powder-coated paint for maximum durability

Feeders

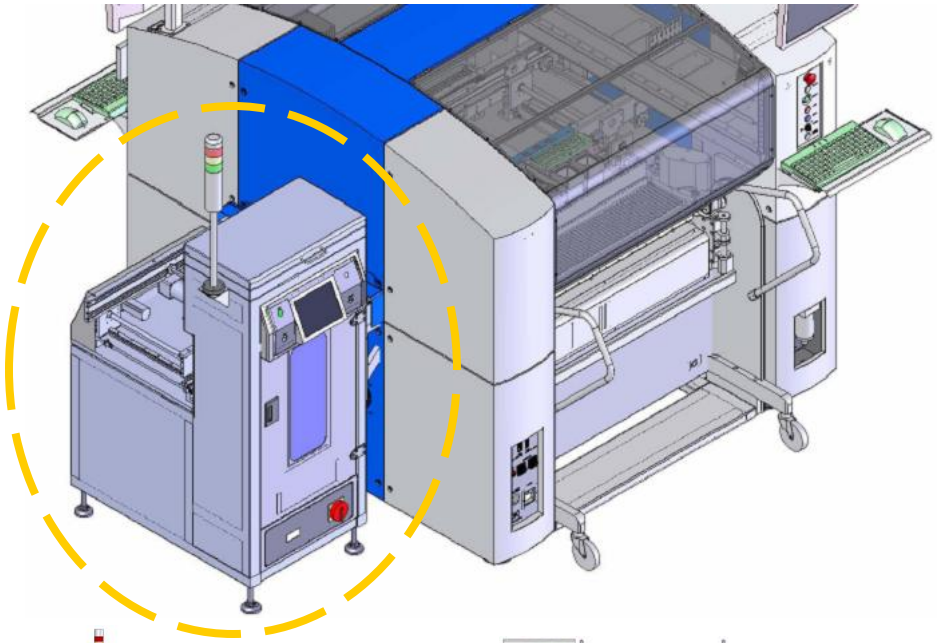
Tape, Tube, Tray Handling



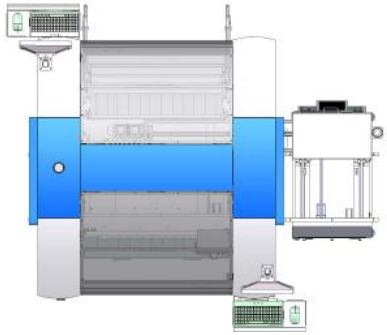
Side Tray Feeder

Special Features

- **EXTERNAL DESIGN** w/built-in buffer conveyor
- **ZERO IMPACT** on feeder capacity
- **ZERO IMPACT** on 16”x18” board handling
- **ZERO IMPACT** on docking feeder cart configuration
- **DIRECT TRAY FEED** with removable cartridge for quick change over
- **LARGE CAPACITY** for up to 20 JEDEC tray/part numbers - (one per level); empty tray automatically moves to top position for convenient access & replenishment
- **NO REJECT BELT** - rejected parts returned to tray for improved defect info management
- **PRE-FETCHES** for optimum performance
- **SMALL FOOTPRINT** - 680mm (2.23’) line length includes built-in buffer conveyor
- **PLC** interface with easy to read LCD screen for accurate setups



Front View

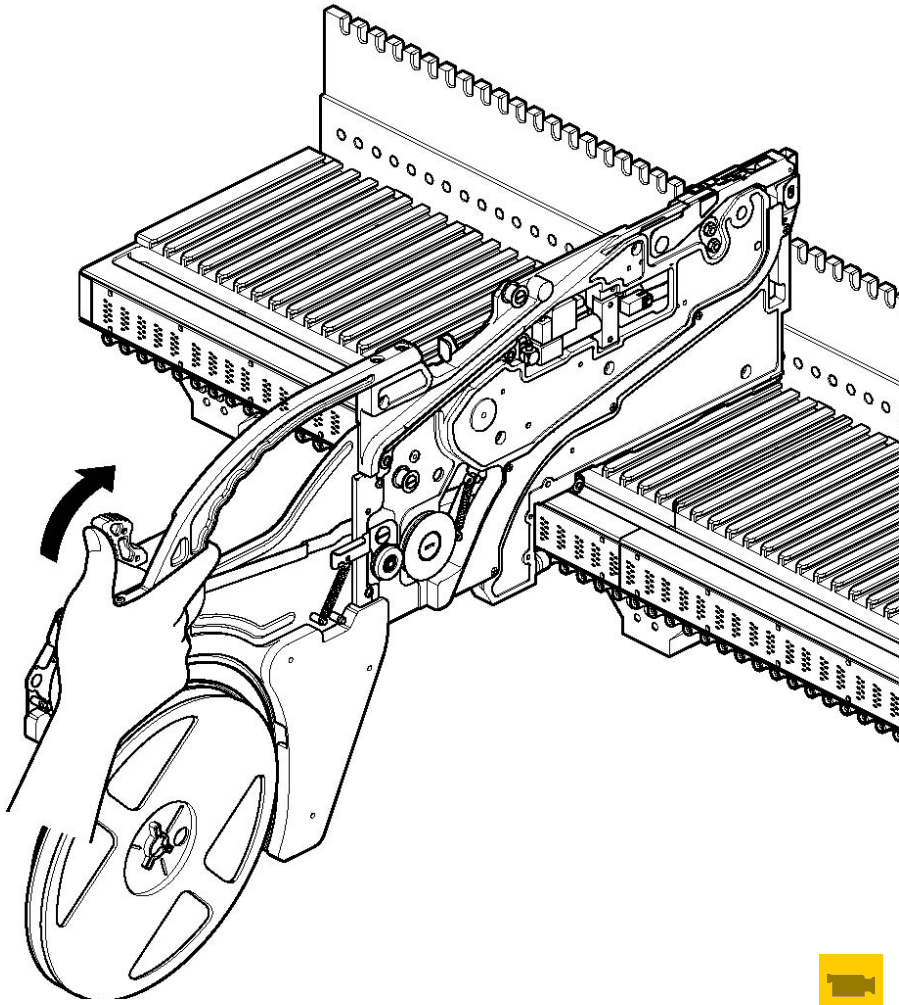


Top View

Feeder Slot Occupancy

Tape, Tube, & Tray Handling

Type	*Slots Occupied*
8mm Tape Feeder	1
12mm Tape Feeder	2
16mm Tape Feeder	2
24mm Tape Feeder	3
32mm Tape Feeder	3
44mm Tape Feeder	4
56mm Tape Feeder	5
72mm Tape Feeder	6
Vibratory Stick Feeder (multi-stick)	9
3.5mm Belt Stick Feeder (single stick)	2
10mm Belt Stick Feeder (single stick)	3
Air Stick Feeder (multi-stick)	2
Manual Tray Holder (two trays)	23
Tray Handler (20 step non stop / 40 tray)	34
Side Tray Feeder (20 step / 20 tray)	0
Dip Fluxing Module	6

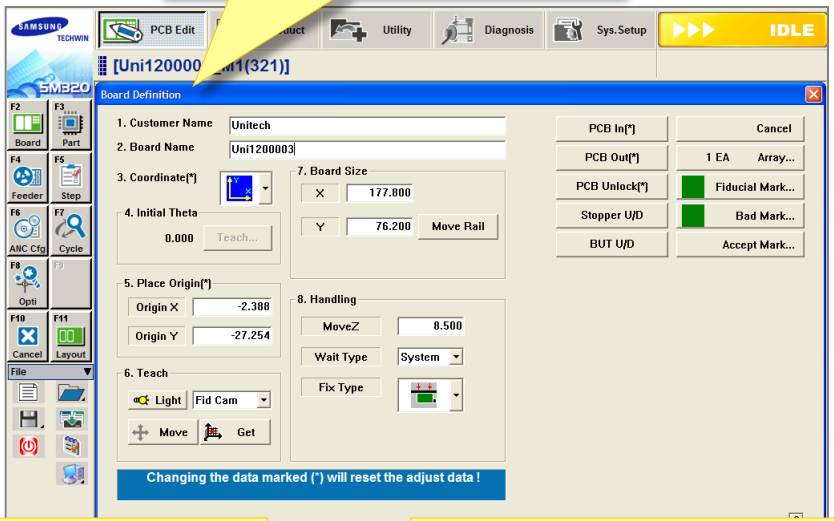


Programming Software

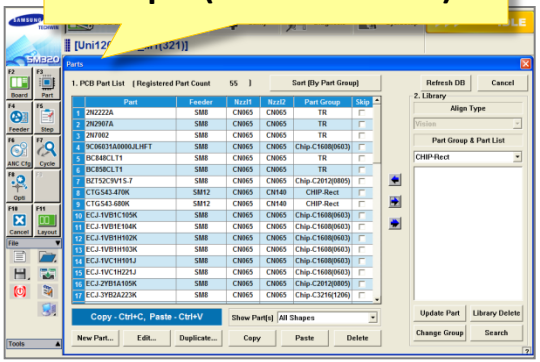
Man-machine-interface (MMI)

- **Menu Driven MMI** (Man-Machine-Interface) software with embedded offline programming and powerful diagnostics for troubleshooting
- **1100 generic packages**, multi-level password protection, step program with placement angle preview, and component teach / placement location learn capable
- **EasyOLP** for advanced offline programming & line balancing (optional); GerbMounter for gerber file translation

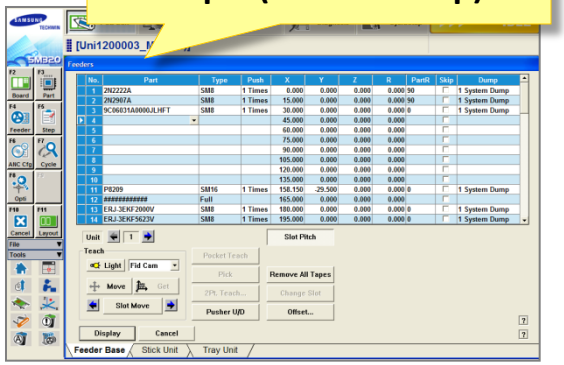
Step 1 (Board Definition)



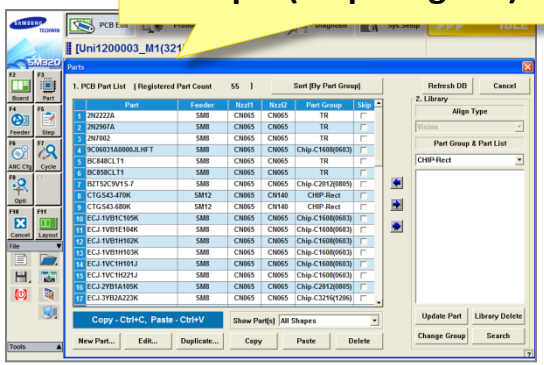
Step 2 (Part Definition)



Step 3 (Feeder Setup)

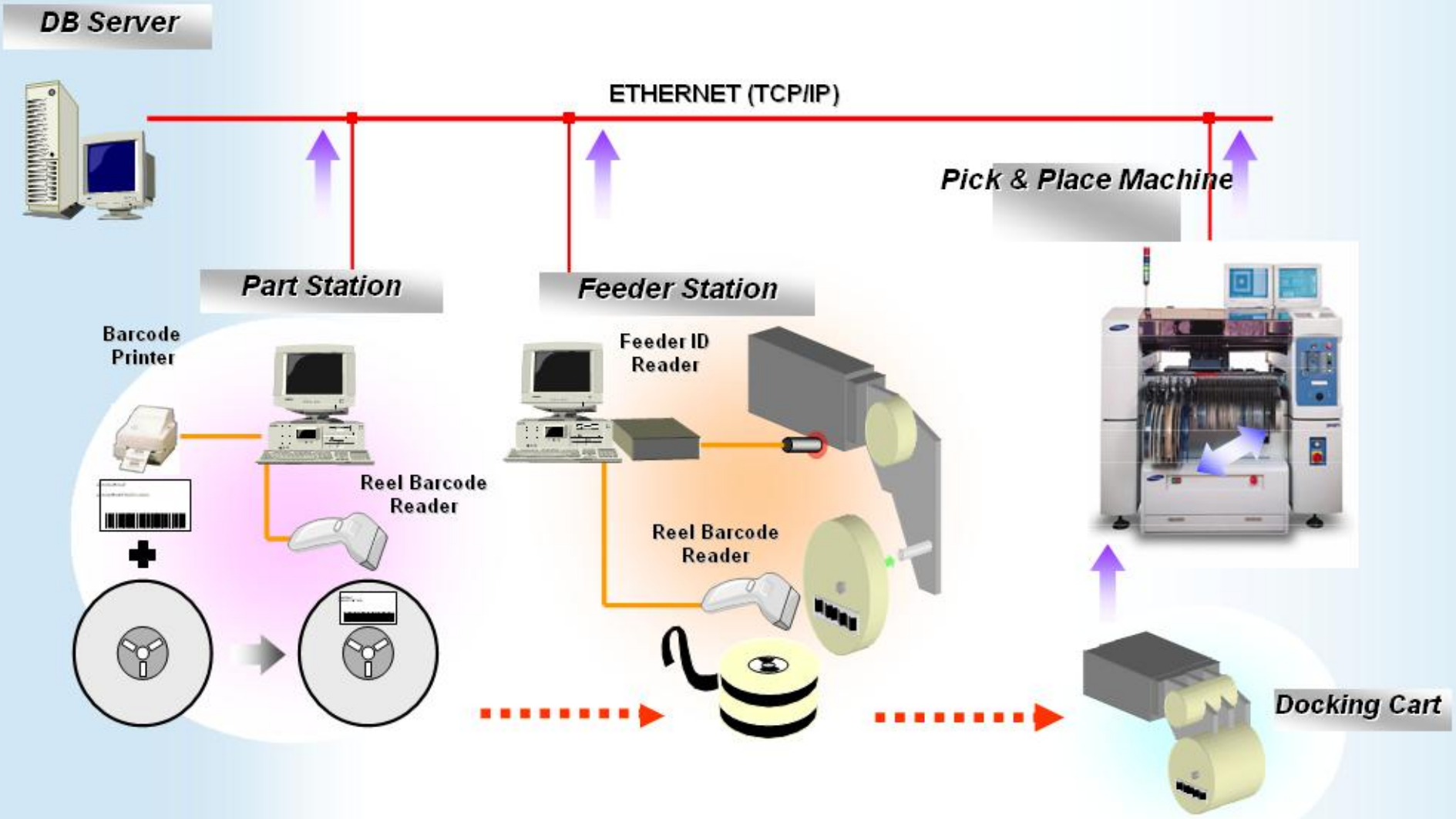


Step 4 (Step Program)



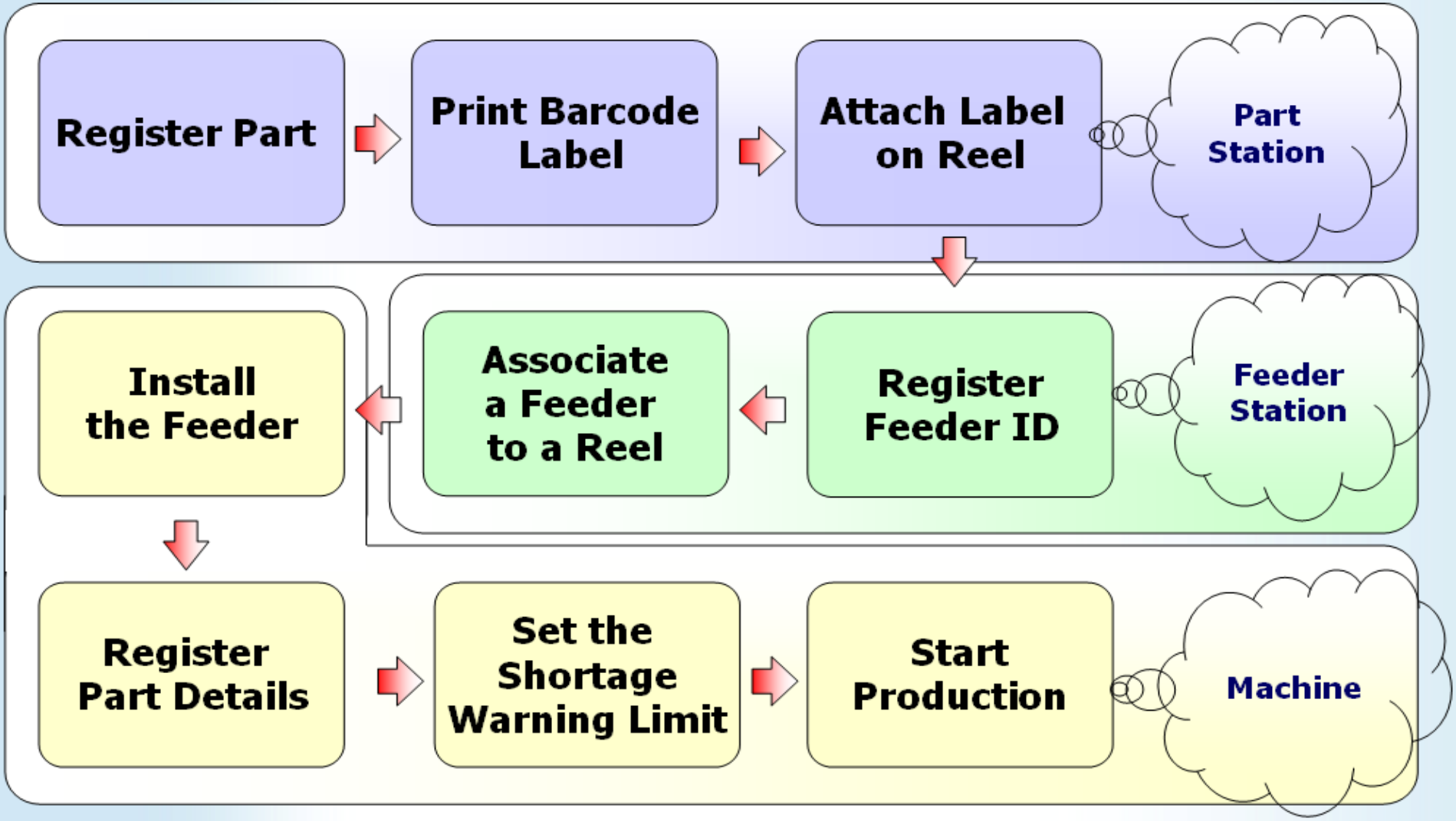
IT System

Hardware



IT System

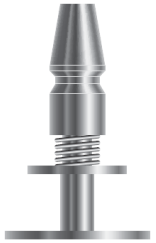
Process Flow



Nozzles

Standard, Odd-shaped, Calibration

Nozzle Name	CN020	CN030	CN040	CN065	CN140	CN220	CN400N	CN750	CN1100
Nozzle Shape									
O.D.(mm)	Φ 0.5	Φ 0.7	Φ 0.75	Φ 1.2					
I.D.(mm)	Φ 0.16	Φ 0.28	Φ 0.38	Φ 0.6					
Applicable Components	0402 (01005)	0603(0201)	1005~2012 SOT	1608~6 SOT					
Minimum Width of Component	0.2	0.3	0.5~1.25	0.8~2.					

Nozzle Name	CTP200	CTP400	CNT20
Nozzle Shape			
Use	Odd Shaped Components	Odd Shaped Components	Calibration
O.D.(mm)	-	-	Φ 15.4
I.D.(mm)	-	-	Φ 2.0
Pickup Area	2 x 10	4 x 12	-
Minimum Width of Component	2.5~	4.5~	-