SMART SOLUTIONS

A-Series

The best Value of Ownership in high volume and high product mix environments

PHILIPS

Assembléon

Contents

Introduction

The best Value of Ownership in high volume and high product mix environments

We understand the growing need for flexibility in your production lines. Manufacturing an ever greater variety of electronic goods with an ever more limited shelf life, means faster product changeovers, fluctuating volumes and shorter times-to-market. What's more, increasing product complexity and the trend to electronic modules make it all the harder to choose the right line setup to suit all applications.

More than ever, pick & place solutions require the versatility to mix-and-match large and small batches, with a low or a high product mix, at increasingly demanding quality levels – while still keeping operating costs low without sacrificing performance levels. This is where the A-Series come in, offering the best Value of Ownership.

The AX-501 and AX-301 can be scaled in small steps to the desired output capacity on the same machine meeting your demands. Permanent or temporary. Called True Capacity on Demand, this concept is the most effective way of dealing with production peaks. Saving over 20% in investment costs by temporary adding extra, rented capacity.

Combined with an industry low electricity consumption (up to 50% less than the industry average), the AX-501 and AX-301 also contribute to sustainable electronics manufacturing.

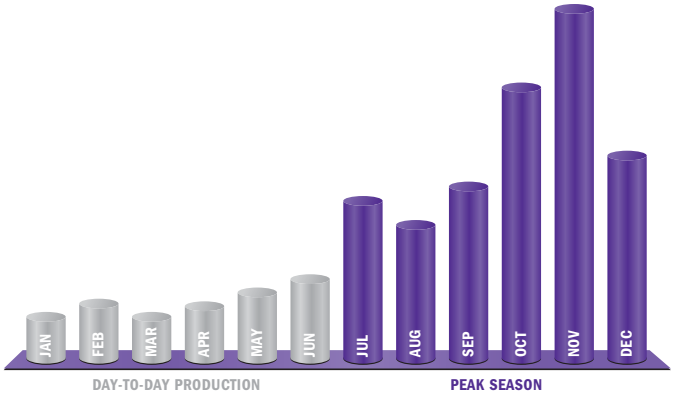
Your route to market success via service and support

It's key to optimize line output and yield, minimize process changeover times, improve the production line's ramp-up, and continuously manage the Assembléon machines' operational costs. To accomplish this, Assembléon's service and support program embodies a wide range of value-added performance, knowledge and technical services for existing production lines and new machines. It is part of the company's integrated approach to SMT assembly, developed in response to the challenges of today's manufacturing environment in which production requirements change continuously. Assembléon's service and support program ensures a customer's machine park is kept operating competitively during its entire life.

True Capacity on Demand

The most effective way of dealing with production peaks

TAKE CHARGE



Buy sufficient equipment for day-to-day production, then hire extra capacity during peaks in demand. It's that easy.

Assembléon's True Capacity on Demand is a simple way of giving you real flexibility in your production capacity. You can save up to 20% on your initial equipment investment by installing the appropriate number of our A-Series pick & place machines to precisely match your base loading.

Then, when you experience increases in demand, simply hire additional robot heads - that don't require any additional space on your line - so you can increase your output. When the peak period is over, we take the robot heads back. In that way your manufacturing capacity always matches demand.

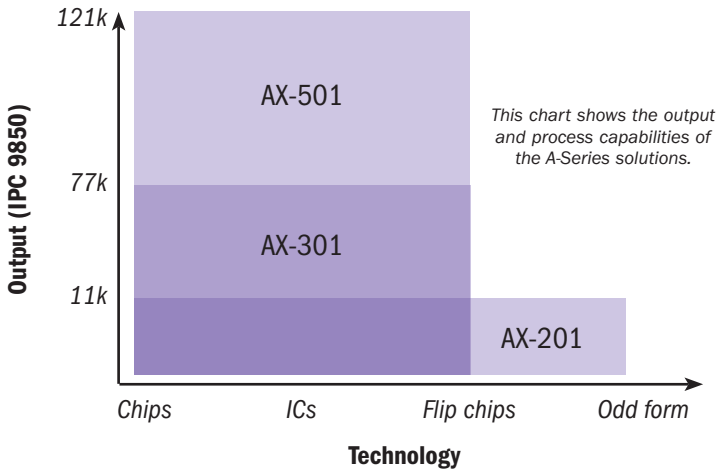
Each standard robot head (SPR) can be temporarily replaced by two compact robot heads (CPR), doubling production capacity on the spot during peak periods.

Leading in 'green'

With our A-Series machines you don't just get the best performance; you also benefit from the lowest energy and air consumption in the industry. This leads to lower bills up to 50%, reduced CO_2 and smaller carbon footprint. The additional robot heads supplied through the True Capacity on Demand program are stored and refurbished at various local sites to minimize transport requirements.

GO GREEN

A-Series



This chart shows the output and process capabilities of the A-Series solutions.

AX-501/ AX-301

Scalable output, high first-pass yield

While maintaining their small footprint, the AX-301 and AX-501 can be scaled in small steps to desired output capacity between 30k and 121k components per hour (cph) (IPC 9850), making it an excellent solution for manufacturer's dealing with seasonality patterns, without compromising placement accuracy. The machines handle components from 01005 up to 45 x 45 mm fine-pitch QFP, BGA, µBGA and CSP packages, and components up to 10.5 mm tall (10.5 over 10.5 mm), with a placement accuracy of 40 microns at 3 sigma and placement forces as low as 1.5N. At any speed the A-Series can place with defect levels lower than 10 dpm.

The AX-501 and AX-301 solutions hold up to 260 feeding lanes per machine. Additionally, they handle feeder options such as stick feeders, tray feeders, bare die (wafer) feeders and bulk feeders, all without sacrificing board width or other feeder positions.

AX-201

High placement accuracy, ultra wide component range

The AX-201 offers a unique combination of high placement accuracy and an extremely wide component range while maintaining a fast placement rate. With a placement rate of up to 11k cph (IPC 9850) and a placement accuracy of 20 microns at 3 sigma. It handles components from 01005 to large components, such as connectors, up to 130 x 79 mm with placement forces up to 40N. Furthermore, without compromise, it handles fine-pitch QFP, BGA, µBGA, CSP packages and components up to 40 mm tall (or 25 over 25 mm) with placement forces as low as 0.9N.

The AX-201 holds up to 212 feeding lanes. Additionally, the AX-201 handles a wide range of feeder options such as stick feeders, tray feeders, tape feeders, bare die (wafer) feeders, radial feeder, tube feeders and many other feeding types to handle any application.

Component capabilities

From 01005 to 130mm odd-form

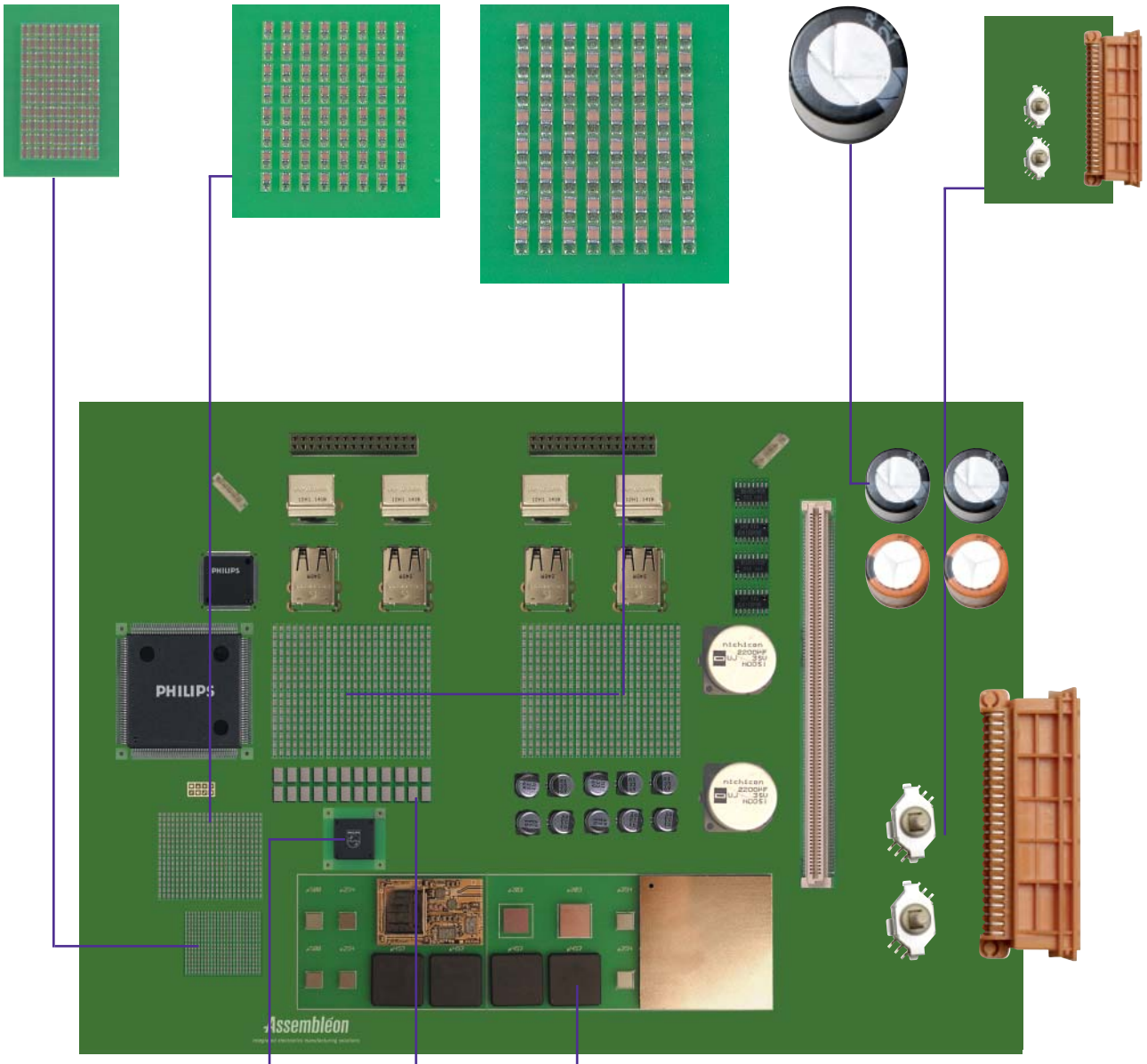
01005 chips
80 micron interspacing

0201 chips

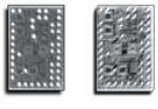
0402 chips

aluminium
capacitor
(40 mm tall)

max 130 x 79 mm
odd-form
components



Reverse side of CSP (micro BGA)
Bumpsize is down to 30 microns*



Flip chips
Bumpsize is down
to 30 microns*

Reverse side of BGA
Bumpsize is down to 30 microns*

* 30µ bumpsizes: XSFOV camera required and for components up to 6x6mm

AX-501/AX-301

Scalable output, high first-pass yield

	AX-501	AX-301
Maximum output per hour	165k	99k
IPC 9850 output per hour	50k to 121k	30k to 77k
Board quality	< 10 dpm	< 10 dpm
Placing accuracy at 3 sigma	40 microns	40 microns
Component range	0.4 x 0.2mm (01005) to 45 x 45mm (0.016 x 0.008” to 1.77 x 1.77”)	0.4 x 0.2mm (01005) to 45 x 45mm (0.016 x 0.008" to 1.77 x 1.77")
Maximum component height	10.5mm (0.41”) 12mm (0.47”, restrictions apply)	10.5mm (0.41") 12mm (0.47”, restrictions apply)
Toolbit exchange	automatic nozzle exchange	automatic nozzle exchange
Maximum board size (L x W) Standard Optional	 515 x 390mm (20.3 x 15.4”) 800 x 457mm* (31.5 x 18”) * restrictions apply	 475 x 390mm (18.7 x 15.4") 475 x 457mm* (18.7 x 18") * restrictions apply

Base and transport

AX-501

- Up to 20 robots
- Up to 260 feeding lanes
- Up to 47 trays
- Length: 3.7 m (12.1 ft)

AX-301

- Up to 12 robots
- Up to 156 feeding lanes
- Up to 47 trays
- Length: 2.7 m (8.85 ft)

PCB transport

- Automatic width adjustment
- Automatic board thickness adjustment
- Zero board loading and unloading time
- Up to 10 mm board thickness
- Left-to-right or right-to-left transport direction
- SMEMA or Japanese height

Placement robots

Standard

- 26 pick locations

Compact

- 11 pick locations

Placement heads

Laser vision

- Laser alignment on-the-fly for maximum output
- Fiducial and artwork recognition
- Maximum component height:
  - 10.5 mm for components < 17.5 x 17.5 mm (L x W)
  - 6.3 mm for components < 24 x 24 mm (L x W)
  - 4.3 mm for components < 45 x 45 mm (L x W)
- Programmable placement force 1.5 N - 8 N
- Automatic board warpage correction

Single vision

- Fiducial and artwork recognition
- Maximum component height:
  - 10.5 mm for components < 45 x 45 mm (L x W)
- Programmable placement force 1.5 N - 8 N
- Automatic board warpage correction

Component alignment

Laser alignment

- Components up to 17.5 x 17.5 mm

CV camera alignment

- Components up to 45 x 45 mm
- Bumpsize down to 150 microns
- 3 different light types capable of aligning any component type

XSFOV camera alignment

- Components up to 6 x 6mm
- Bumpsize down to 30 microns

Feeding platform

Feeder trolley

- Up to 27 feeding positions
- Supports tape, bulk, stick, label, bare die and other feeding types
- Tape cutting capability

Tray trolley

- Up to 47 trays
- Replenishment on-the-fly

AX-201

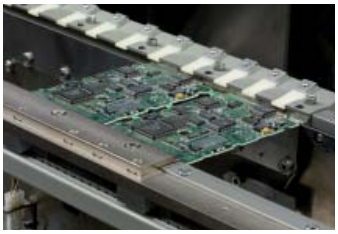
High placement accuracy, ultra wide component range

Maximum output per hour	18k
IPC 9850 output per hour	11k
Board quality	< 10 dpm
Placing accuracy at 3 sigma	20 microns
Component range	0.4 x 0.2 mm (01005) to 130 x 79 mm (0.016 x 0.008" to 5.12 x 3.11")
Maximum component height	40 mm (1.6")
Toolbit exchange	automatic nozzle or gripper exchange
Maximum board size (L x W) Standard Optional	 515 x 457 mm (20.3 x 18") 800 x 457mm* (31.5" x 18") * restrictions apply

Base and transport

AX-201

- Up to 6 heads
- Up to 212 feeding lanes
- Up to 240 trays
- Length: 1.8 m (5.99 ft)



PCB transport

- Automatic width adjustment
- Automatic board thickness adjustment
- Up to 10 mm board thickness
- Left-to-right or right-to-left transport direction
- SMEMA or Japanese height

Robots

X-Y robot

- Linear motors H-drive gantry system for highest accuracy and speed
- H-drive concept avoids drag, pull and dog-tail effects

Placement heads

Dual vision

- Fiducial and artwork recognition
- Simultaneous alignment up to 4 components
- Programmable placement force range of 2 N - 8 N
- Maximum component height 12 mm

High accuracy

- Fiducial and artwork recognition
- Simultaneous alignment up to 2 components
- Programmable placement force range of 0.9 N - 40 N
- Maximum component height 40 mm
- Variable through-hole check

Component alignment

Large Field of View (LFOV)

- Components up to 130 x 79 mm
- Bumpsize down to 150 microns
- 4 different light types capable of aligning any component type

Small Field of View (SFOV)

- Components up to 22 x 22 mm
- Bumpsizes down to 80 microns
- 3 different light types capable of aligning any component type

Feeding platform

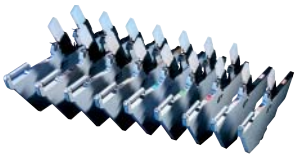
Feeder trolley

- Up to 27 feeding positions
- Supports tape, stick, label, bare die, odd-form and many other feeding types
- Tape cutting capability

Tray trolley

- Up to 60 trays (JEDEC size)
- Replenishment on-the-fly

Options and accessories



Twin bulk feeder

- For feeding capacitors and resistors in bulk case
- Available feeder types: C0201, RC0402, RC0603, RC0805, MELF0604, Melf0805

Single tray feeder

- Single tray components, maximum of 30 JEDEC trays

Intelligent tape feeder (ITF2/ITF3)

- From 8 mm to 88 mm tapes

Manual tray

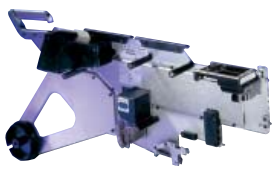
- Fits up to 2 JEDEC trays

Twin tape feeder 8 mm (TTF)

- Doubles the capacity of 8 mm tapes

Surftape® feeder 8 mm

- For bare die products
- Sizes from 0,3 x 0,3 mm to 2,5 x 2,5 mm
- Presented in chip on board direction

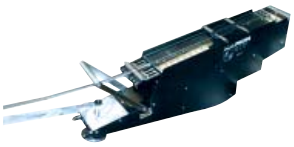


Label feeder

- For feeding pre-printed labels

Waffle pack feeder

- For bare die products, sizes from 1 x 1 mm
- Waffle pack sizes 2 x 2" and 4 x 4"



Stick feeder

- For feeding SMD components in stick
- Available types: SO8 to PLCC100, generic and customized

Single wafer feeder

- For bare die products
- Sizes from 0,5 x 0,5 mm
- Direct from wafer in flip-chip and chip on board mode

Carrier tape tray

- For feeding small strips of tape
- 8 mm to 200 mm width

GPAX 2400 Ultraflex feeder

- For feeding odd-form components supplied in GPAX carriers

Tray trolley

- Multiple tray components, maximum of 60 JEDEC trays
- High Speed

Radial feeder

- For through-hole radial components
- Available for 12,7 mm and 15 mm radial tapes

Horizontal tube feeder

- For odd-form components supplied in tubes

Gripper

- Can pick and place a large variety of odd-form components
- Custom grippers available on request
- Kit available to make own gripper design

Device programming feeder (Data I/O)

- For inline programming and feeding of memory devices (NOR and NAND Flash, M-Systems Disk on Chip, microcontrollers)

Board identification/ barcode triggered changeover

- Records barcode ID and traceability information and can initiate automatic program changeover
- Support for 1D or 2D barcodes

Service tools

- Quick problem analysis, verification and calibration are available for various system modules

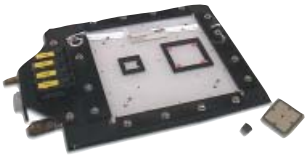
A-Series vision tool

- Simple tool for offline preparation of component vision files

Feeder storage carts

- Available in 22 or 50 positions

Accuracy verification set



- Simple, 30-minute closed-loop process

Tape splicing tool

- For connecting tapes from sizes 8 to 24 mm, to minimize production interruptions

Second user-interface

- Increases operator efficiency

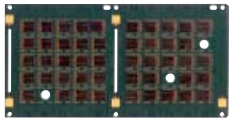
Nozzles

- Can pick and place any component type
- Customized nozzles available on request

Multi-language support

- Many languages supported
- User-interface elements presented in native languages, including help screens

Multiple level badmark reading



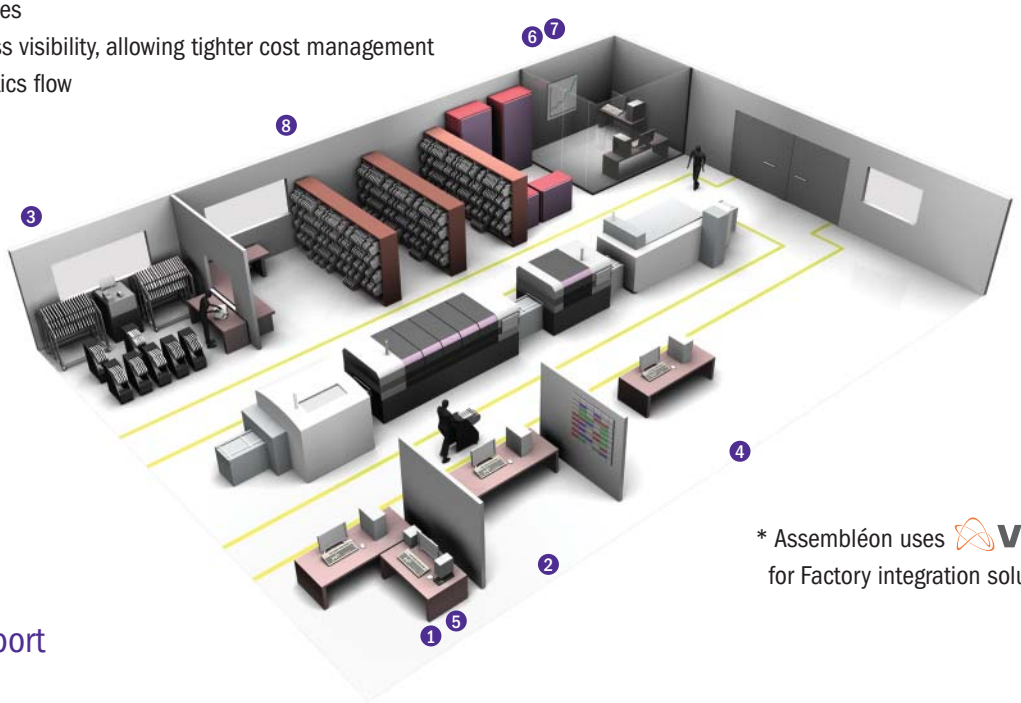
- Avoids placement on faulty circuits

Factory integration
Optimize your SMT production line's performance

Factory integration is a set of software and hardware modules to optimize the performance of Assembléon pick & place solutions by streamlining setup and manufacturing for both new and existing installations. The potential cost savings allow a faster return on investment, while the performance improvements help increase your competitiveness in the global market.

Factory integration delivers:

- Shorter design-to-production time
- Faster setup and ramp-up for different products
- Increased operational efficiency, giving better profitability
- More control at machine and line level
- Lower defect rates
- Excellent process visibility, allowing tighter cost management
- Optimized logistics flow



* Assembléon uses valor for Factory integration solutions

Process support

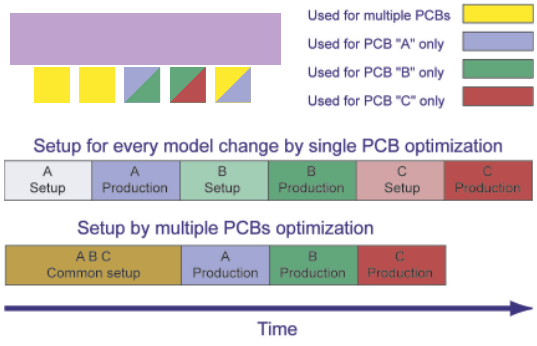
The modules to support the SMT manufacturing processes are shown in the figure above. In each process, one or more of the modules can be applied to optimize performance.

1. **Data preparation** – creating vision files, carrying out data conversion and verifying components offline to save production time
2. **Production scheduling** – scheduling single machines and balancing complete lines to increase operational efficiency, minimize changeovers
3. **Setup verification** – supporting verification of online and offline closed-loop setups to save time and avoid placement errors
4. **Line control** – providing remote line monitoring operation to enable a 'single-click product changeover'
5. **Parts library management** – placement program and component-related data management system, enabling efficient data preparation and shorter time-to-volume
6. **Traceability** – tracking parameters like lot changes to improve quality control and to follow work in progress
7. **Performance analysis** – uploading performance analysis data to efficiency monitoring systems
8. **Parts warehousing** – reporting component usage and use of new feeding lanes to assist inventory control

Data preparation

- CAD import and editing (Centroid, GenCAD, Gerber)
- BOM import and editing
- Machine / Line configuration
- Offline vision preparation tool:
  - Teach camera settings for parts
  - Edit parts-related data
  - Eliminate machine usage for new parts teaching

Production scheduling

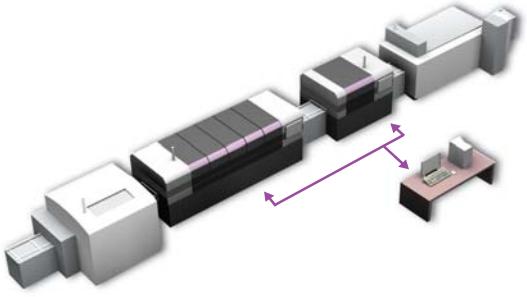


- Single machine optimization
- Line optimization (optimal cycle time)
- Cycle time prediction
- Optimized feeder setup for multiple boards:
  - Minimize/eliminate changeover time between product changeovers
  - Cycle time optimizations

Setup verification

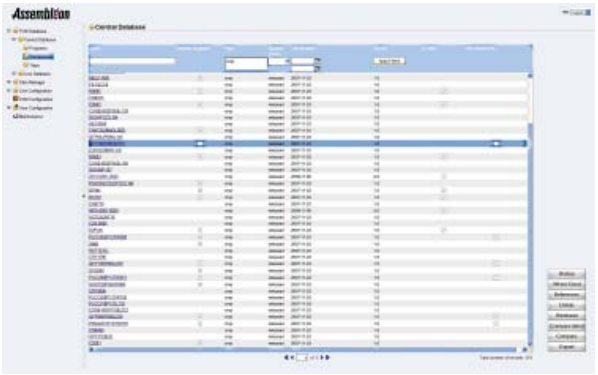
- Operator guidance in creating the setup
- Offline feeder/trolley setup:
  - Scan barcodes on component feeding lanes
  - Intelligent feeders automatically verify match between component ID and feeder slot
- Online feeder/trolley setup:
  - Continuously monitor machine setup
  - Automatic feeder pitch setting
  - Supports splice detection
  - Warn operator before feeder runs empty

Line control



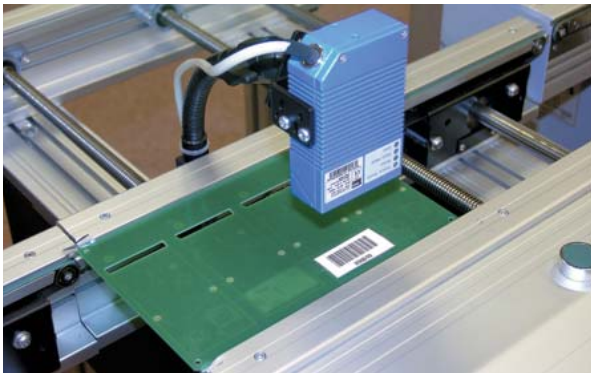
- Manage placement programs for all machines in the factory

Parts library management



- Central data storage of:
  - part dimensions
  - vision information
  - feeder information
  - toolbit information
  - placement programs
- Share data with all connected equipment
- Manipulate parts-related data using the parts editor
- Data backup facilities

Traceability

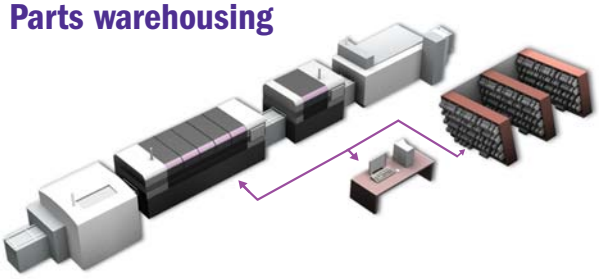


- Export traceability data:
  - Production machine, status, data and time
  - Board identification (barcode)
  - Program name
  - Parts (information available from the setup verification system)
- Failsafe data transport mechanism
- Selectable traceability level:
  - Board traceability
  - Batch traceability

Performance analysis

- Export performance related data:
  - Machine status
  - Active program name
  - Board-count
  - Component consumption
  - PPM-numbers
  - Error-events
  - Efficiency data
- Analysis tool to maximize machine performance

Parts warehousing



- Export component consumption

A-Series specifications

	AX-501	AX-301	AX-201
Maximum output per hour	165k	99k	18k
IPC 9850 output per hour	30k to 121k	30k to 77k	11k
Board quality	< 10 dpm	< 10 dpm	< 10 dpm
Placing accuracy at 3 sigma	40 microns	40 microns	20 microns
Interspacing	80 microns	80 microns	80 microns
Component range	0.4 x 0.2mm (01005) to 45 x 45mm (0.016 x 0.008" to 1.77 x 1.77")	0.4 x 0.2mm (01005) to 45 x 45mm (0.016 x 0.008" to 1.77 x 1.77")	0.4 x 0.2mm (01005) to 130 x 79mm (0.016 x 0.008" to 5.12 x 3.11")
Maximum component height	10.5mm (0.41") 12mm (0.47", restrictions apply)	10.5mm (0.41") 12mm (0.47", restrictions apply)	40mm (1.6")
Toolbit exchange	automatic nozzle exchange	automatic nozzle exchange	automatic nozzle or gripper exchange
Maximum board size (L x W) Optional board size	515 x 390mm (20.3 x 15.4") 800 x 457mm* (31.5 x 18") *with restrictions	475 x 390mm (18.7 x 15.4") 475 x 457mm* (18.7 x 18") * with restrictions	515 x 457mm (20.3 x 18") 800 x 457mm* (31.5 x 18") * with restrictions
Minimum board size (L x W)	50 x 50mm (2 x 2") 50 x 25mm (2 x 1") optional	50 x 50mm (2 x 2") 50 x 25mm (2 x 1") optional	50 x 50mm (2 x 2") 50 x 25mm (2 x 1") optional
Board thickness	0.3 to 6mm (0.012 to 0.24") 10mm (0.39") optional	0.3 to 6mm (0.012 to 0.24") 10mm (0.39") optional	0.3 to 6mm (0.012 to 0.24") 10mm (0.39") optional
Board transport direction	left-right, right-left	left-right, right-left	left-right, right-left
Board transport height	SMEMA (940 - 965mm) and Japanese (885 - 915mm)	SMEMA (940 - 965mm) and Japanese (885 - 915mm)	SMEMA (940 - 965mm) and Japanese (885 - 915mm)
Feeding positions	260 twin tapes, 130 single tapes, 47 trays	156 twin tapes, 78 single tapes, 47 trays	212 twin tapes, 106 single tapes, 240 trays
Other feeder options	tape, bulk, stick, tray, bare die	tape, bulk, stick, tray, bare die	Tape, stick, tray, bare die, tube, GPAX, radial and many others
Alignment principle	laser and camera	laser and camera	camera
Placement force	1.5 to 8 N	1.5 to 8 N	0.9 to 40 N lower forces possible upon request
Footprint (L x W) (incl. front side feeder trolleys)	3720 x 2285mm (146 x 90")	2760 x 2285mm (109 x 90")	1852 x 2265mm (73 x 89")
Single-sided operation	yes	yes	yes (optional double-sided)

A-Series features

			AX-501	AX-301	AX-201
Subsystem	Placement robot	Standard placement robot	■	■	
		Compact placement robot	■	■	
		X-Y robot			■
	Placement head	Laser vision	■	■	
		Single vision	■	■	
		Dual vision			■
		High accuracy			■
	Camera	Component vision LFOV camera	■	■	■
		Component vision SFOV camera			■
		Component vision XSFOV	■	■	
Trolleys		A-Series feeder trolley	■	■	■
		A-Series tray trolley (tray feeding)	■	■	■
Feeding	Tapefeeding	TTF 8 mm, 13" reel or 7” reel	■	■	■
		ITF2 8 mm, 13" reel	■	■	■
		ITF2 12 mm, 13" reel	■	■	■
		ITF2 16 mm, 13" reel	■	■	■
		ITF2 24 mm, 13" reel	■	■	■
		ITF2 32 mm, 15" reel	■	■	■
		ITF2 44 mm, 15" reel	■	■	■
		ITF2 56 mm, 15" reel	■	■	■
		ITF2 72 mm, 15” reel	■	■	■
		ITF2 88 mm, 15” reel	■	■	■
	Bulkfeeding	C0201, 2 lanes	■	■	
		C0402, 2 lanes	■	■	
		R0402, 2 lanes	■	■	
		C0603, 2 lanes	■	■	
		R0603, 2 lanes	■	■	
		MELF R0604, 2 lanes	■	■	
		C0805T0.6, 2 lanes	■	■	
		C0805T1.25, 1 lane	■	■	
		R0805, 2 lanes	■	■	
		MELF R0805, 1 lane	■	■	

			AX-501	AX-301	AX-201
Feeding	Other	Carrier tape tray			■
		Stick feeding	■	■	■
		Tray stackers			■
		Surftape feeding	■	■	■
		Waffle pack feeding			■
		Direct die feeder ultra	■	■	■
		GPAX feeding			■
		Radial tape feeding			■
		Stacked tube feeding			■
		Label feeding	■	■	■
		Re-use feeder	■	■	
		Device programming feeding (Data I/0)	■	■	■
Options		Accuracy verification set			■
		Multi-language user interface	■	■	■
		Board indentifications	■	■	■
		Barcode triggered changeover	■	■	■
		Transport left-right, right-left	■	■	■
Software		Windows XP™ graphical user-interface	■	■	■
		Operating monitor touchscreen frontside	■	■	■
		2nd operating monitor touchscreen (rear or leftside)	■		■
		Artwork recognition	■	■	■
		Multi-level badmark reading	■	■	■
		Adaptive pick	■	■	■
		Alternative feeder function	■	■	■
		Online help function	■	■	■
		Management information system	■	■	■
		Online program editor	■	■	■

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