

# SMART SOLUTIONS



## A-Series

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



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# 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.

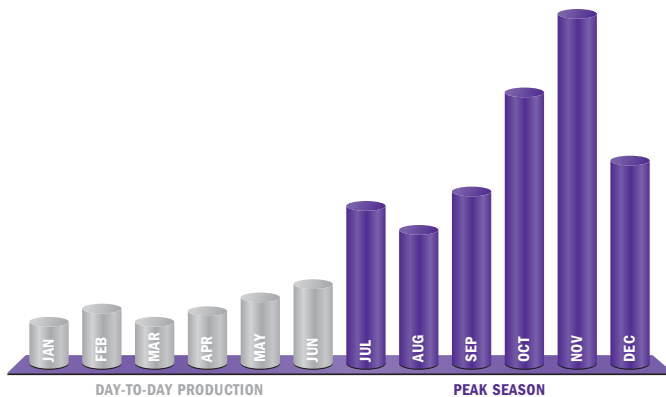
### Your route to market success via service and support

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



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.



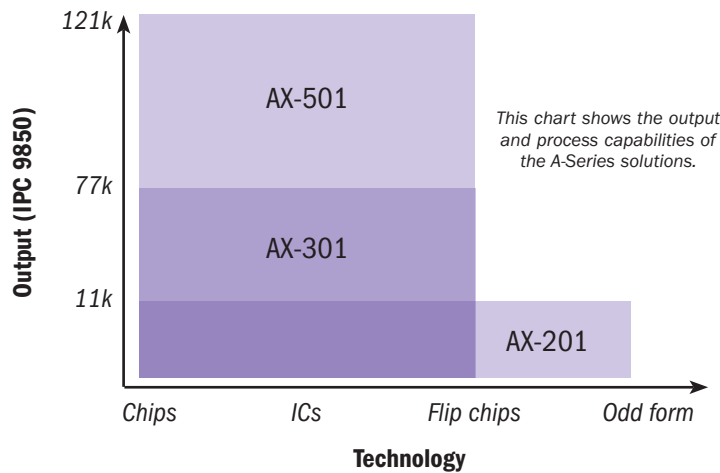
Each standard robot head (SPR) can be temporarily replaced by two compact robot heads (CPR), doubling production capacity on the spot during peak periods.

## 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<sub>2</sub> 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.



# A-Series



## 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 45mm fine-pitch with a placement accuracy down to 40 microns (laser) or 35 microns (camera), CpK >1. Moreover, the new linear TPR robot adds a module with IC outputs up to 16,000 component per hour from tape and reel. The easy to exchange trolleys allow the TPR also to be configured for high speed IC shooting - up to 13,000 cph - from up to two Jedec tray stackers, making it the ideal all-in-one machine solution for applications with high similar IC count such as DRAM. At any speed the A-Series can place with defect levels lower than 10 dpm.

The AX-501 holds up to 260 feeding lanes while the AX-301 holds up to 156 feeding lanes.



New TPR robot

## 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 and a placement accuracy of 20 microns, CpK >1. Furthermore, without compromise, it handles fine-pitch QFP, BGA, μBGA, CSP packages and components up to 40mm tall (or 25 over 25mm) with placement forces as low as 0.9N.

The AX-201 holds up to 212 feeding lanes and up to 60 Jedec trays per tray trolley.

# Component capabilities

From 01005 to 130mm odd-form

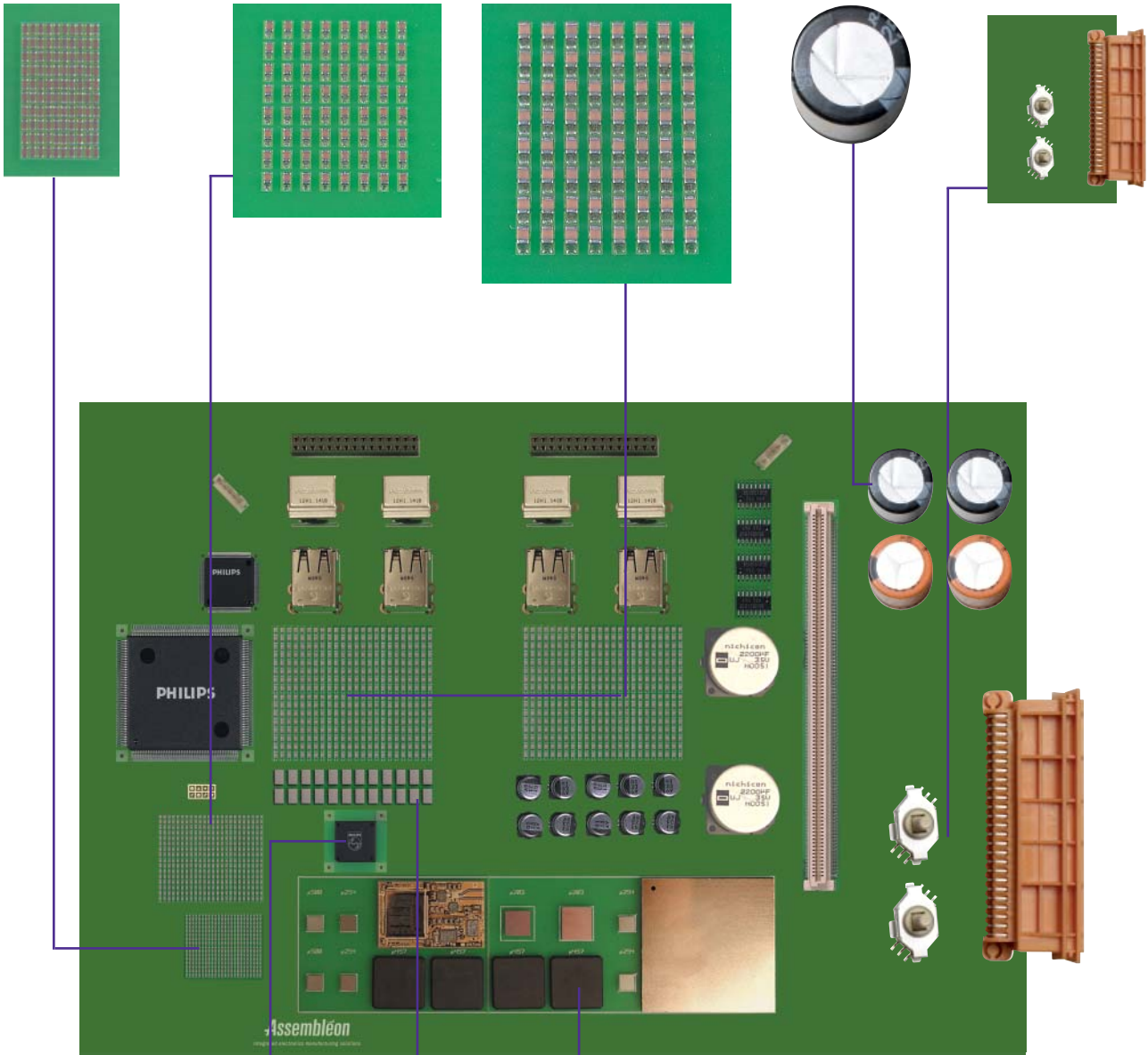
01005 chips  
80 micron interspacing

0201 chips

0402 chips

aluminium  
capacitor  
(40 mm tall)

max 130 x 79 mm  
odd-form  
components



\* 30µ bumpsizes: XSFOV camera required and for components up to 6x6mm (AX-501/301 only)

# 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 micron for laser align 35 micron for camera align 25 micron on TPR and camera align <b>NEW</b>	40 micron 35 micron for camera align 25 micron on TPR and camera align <b>NEW</b>
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	515 x 390mm (20.3 x 15.4")	475 x 390mm (18.7 x 15.4")
Optional	800 x 457mm (31.5 x 18")	800 x 457mm* (31.5 x 18")
		* restrictions apply



## Base and transport

### AX-501

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



### AX-301

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



### PCB transport

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



## Placement robots

### Standard

- 26 pick locations



### Compact

- 11 pick locations



### Twin

- 46 pick locations
- 2 tray track position
- Up to 16,000 cph IC placement from tape
- Up to 13,000 cph IC placement from tray stacker



**NEW**

## Placement heads

### Laser vision

- Laser alignment on-the-fly
- 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

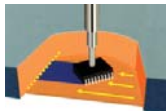
- Fiducial and artwork recognition
- Maximum component height:
  - 10.5 mm for components < 45 x 45 mm (L x W)
- Programmable placement force 1.5 N - 8 N
- Automatic board warpage correction



## Component alignment

### Laser alignment

- Components up to 17.5 x 17.5 mm
- 40µ accuracy



### CV camera alignment

- Components up to 45 x 45mm
- Bumpsize down to 150 micron
- 3 different light types capable of aligning any component type
- 35µ accuracy on SPR
- 25µ accuracy on TPR



### XSF0V camera alignment

- Components up to 6 x 6mm
- Bumpsize down to 30 microns
- 35µ accuracy on SPR
- 25µ accuracy on TPR



## Feeding platform

### Feeder trolley

- Up to 27 feeding positions for up to 54 pick locations
- Supports tape, stick, tube and other feeding types
- Tape cutting



### Trolley with tray stackers

- Up to 2 Jedec tray stackers
- Stacks up to 30 trays per tray stacker
- Up to 13,000 cph IC shooting from tray
- Tray stack replenishment on-the-fly



**NEW**

# AX-201

High placement accuracy, ultra wide component range



Maximum output per hour	15k
IPC 9850 output per hour	9.3k (PH-DV) 6.3k (PH-HA)
Board quality	< 10 dpm
Placing accuracy at 3 sigma	35 micron with PH-DV 20 micron with PH-HA
Component range	1.0 x 0.5mm* to 130 x 79mm (0402 to 5.12 x 3.11")
Maximum component height	40mm (1.6") (25 over 25mm)
Toolbit exchange	automatic nozzle or gripper exchange
Maximum board size (L x W)	
Standard	515 x 457mm (20.3 x 18")
Optional	800 x 457mm (31.5 x 18")

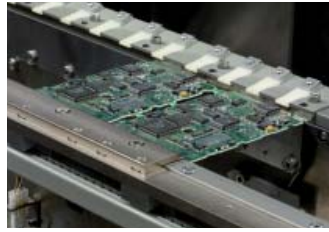
\* smaller on request

## 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 micron
- 4 different light types capable of aligning any component type
- 35 micron accuracy with PH-DV
- 30 micron accuracy with PH-HA



### Small Field of View (SFOV)

- Components up to 22 x 22 mm
- Bumpsizes down to 80 micron
- 3 different light types capable of aligning any component type
- 20 micron accuracy with PH-HA

## Feeding platform



### Feeder trolley

- Up to 27 feeding positions for up to 53 pick locations
- Supports tape, stick, tube and other feeding types
- Tape cutting



### Tray trolley

- 30 pallets
- Up to 60 trays (JEDEC size)
- Replenishment on-the-fly
- High speed tray cache positions

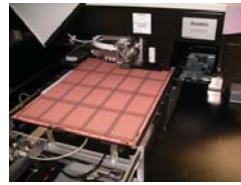
# Options and accessories

(for all equipment unless stated otherwise)



## Tape cutters:

- Decreases waste volume by 80 %
- Only cuts when feeding is active
- Enhances use of feeders



## Large boards

- Increases board lengths to 800mm
- Increases board widths to 457mm

**NEW**



## Dip station

- High volume reliable fluxing
- Plates with various flux depths
- Automatic refreshing of flux

**NEW**



## Twin placement robot

- Increases accuracy to 25 micron
- 16k IC output from tape
- 13k IC output from tray
- Ideal for IC shooting applications such as DRAM

(AX-501, AX-301)



## Gripper

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

(AX-201)



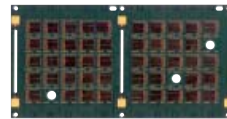
## Nozzles

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



## Board identification/ barcode triggered changeover

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



## Multiple level badmark reading

- Avoids placement on faulty circuits



## A-Series vision tool

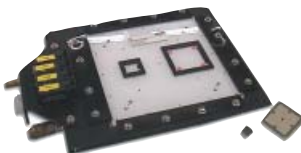
- Simple tool for offline preparation of component vision files



## Second user-interface

- Increases operator efficiency

(AX-501)



## Accuracy verification set

- Simple, 30-minute closed-loop process

(Available for AX-201)  
(AX-501/301 on request)



## Multi-language support

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

# Feeding options



## Intelligent tape feeder (ITF2/ITF3)

- From 4mm to 88mm tapes
- Support new W4P1 tape standard



## Single tray feeder (Jedec tray station)

- Single tray components, maximum of 30 thin JEDEC trays
- High speed IC placement



## Twin tape feeder 8 mm (TTF)

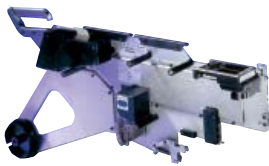
- Doubles the capacity of 8mm tapes



## Manual tray

- Fits up to 2 JEDEC trays

(AX-201)



## Label feeder

- For feeding pre-printed labels

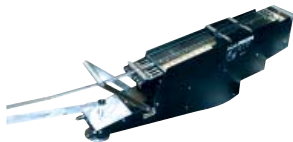
(AX-201 on request)



## Horizontal tube feeder

- For odd-form components supplied in tubes

(AX-201 on request)



## Stick feeder

- For feeding SMD components in stick
- Available types: S08 to PLCC100, generic and customized



## Device programming feeder (Data I/O)

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

(AX-201 on request)



## Carrier tape tray

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

(AX-201)



## Feeder service tools

- Quick problem analysis, verification and calibration for all ITF and TTF feeders



## Tray trolley

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

(AX-201)



## Feeder storage carts

- Stores up to 50 tape feeders (8mm)
- Storage of up to 100 reels (8mm)



**NEW**

## Splice detection

- Real-time splice detection
- Improve just in time parts supply to line
- Reduce cost of recall with exact traceability

(AX-501, AX-301)



## Tape splicing tool

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



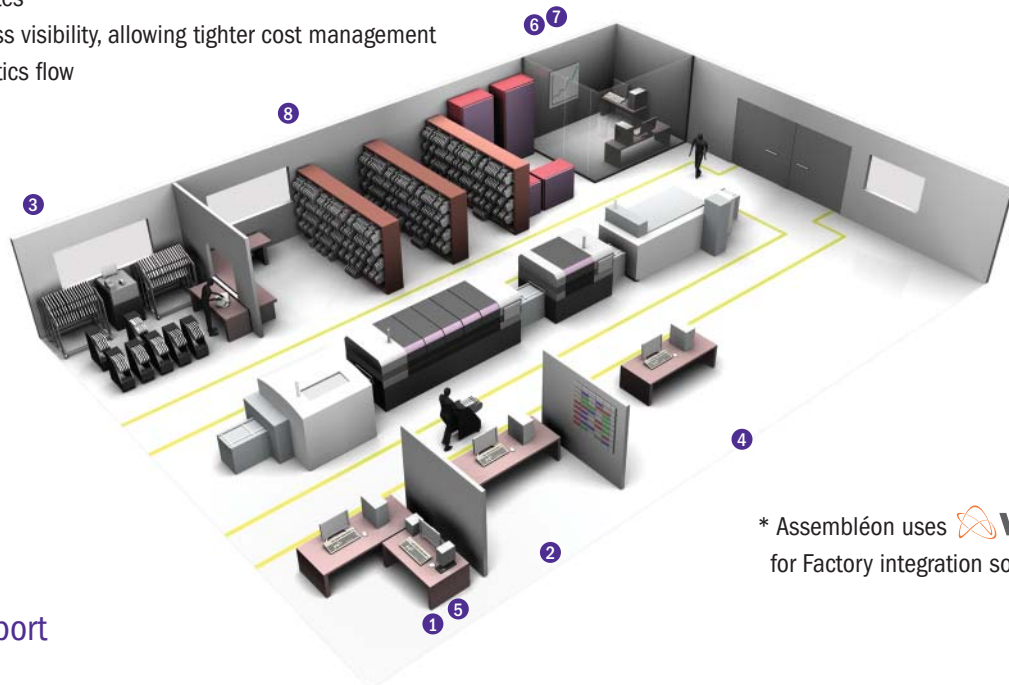
# Factory integration

## 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.

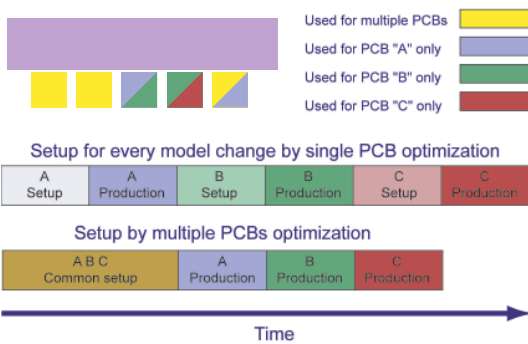
- 1 Data preparation** – creating vision files, carrying out data conversion and verifying components offline to save production time
- 2 Production scheduling** – scheduling single machines and balancing complete lines to increase operational efficiency, minimize changeovers
- 3 Setup verification** – 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
- Virtual sticky tape
- Reverse gerber engineering

## Production scheduling



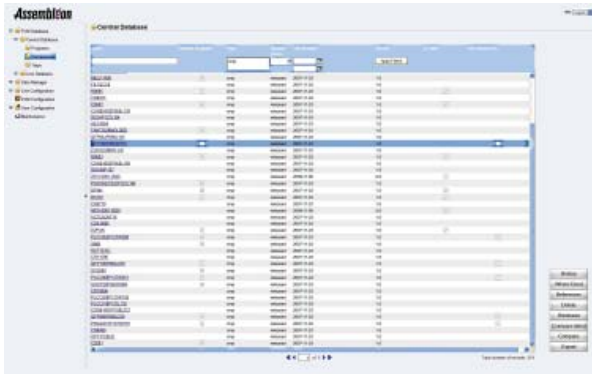
- Single machine optimization
- Line optimization (optimal cycle time)
- Cycle time prediction
- Optimized feeder setup for multiple boards:
  - Minimize/eliminate changeover time between product changeovers
  - Cycle time optimizations
- Family setup
- Multi grouping

## Setup verification



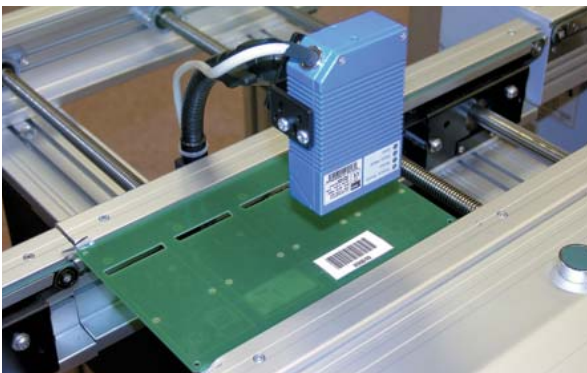
- Operator guidance in creating the setup
- Offline feeder/trolley setup:
  - Scan barcodes on component feeding lanes
  - Intelligent feeders automatically verify match between component ID and feeder slot
- Online feeder/trolley setup:
  - Continuously monitor machine setup
  - Automatic feeder pitch setting
  - Supports splice detection
  - Warn operator before feeder runs empty
- Unique reel ID
  - AVL, RoHs, MSD and alternate vanda checks and support
- Portal for part warehouse management

## Parts library management



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

## Traceability



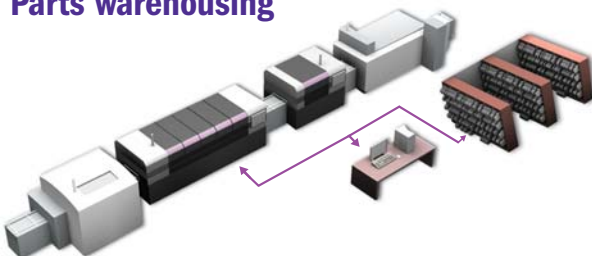
- Export traceability data:
  - Production machine, status, data and time
  - Board identification (barcode)
  - Program name
  - Parts (information available from the setup verification system)
- Failsafe data transport mechanism
- Selectable traceability level:
  - Job traceability
  - PCB traceability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

## 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
- Machine, line a multiline monitoring

## Parts warehousing



- Export component consumption for parts warehousing



# A-Series specifications

	AX-501	AX-301	AX-201
Max. output per hour	165k	99k	15k
IPC 9850 output per hour	30 to 121k	77k	9.3k for PH-DV 6.3k for PH-HA
Board quality	< 10 dpm	< 10 dpm	< 10 dpm
Placement accuracy at 3 sigma	40 microns with laser align 35 $\mu$ (SPR + camera align) 25 $\mu$ (TPR + camera align)	40 microns with laser align 35 $\mu$ (SPR + camera align) 25 $\mu$ (TPR + camera align)	35 $\mu$ for PH-DV 20 $\mu$ for PH-HA
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")	1.0 x 0.5mm* (0402) to 130 x 79mm (0.039 x 0.019" 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")
Component over component	10.5 over 10.5mm	10.5 over 10.5mm	25 over 25mm
Toolbit exchange	automatic nozzle exchange	automatic nozzle exchange	automatic nozzle or gripper exchange
Maximum board size (L x W)	515 x 390mm (20.28 x 15.35")	475 x 390mm (18.7 x 15.35")	515 x 457mm (20.3 x 18")
Optional board size (L x W)	800 x 457mm (31.5 x 18")	800 x 457mm (31.5 x 18") (restrictions apply)	800 x 457mm (31.5 x 18")
Minimum board size (L x W)	50x 50mm (2 x 2") optional: 50 x 25mm (2 x 1")	50x 50mm (2 x 2") optional: 50 x 25mm (2 x 1")	50x 50mm (2 x 2") optional: 50 x 25mm (2 x 1")
Board thickness	0.3 to 6mm optional: 10mm (0.39")	0.3 to 6mm optional: 10mm (0.39")	0.3 to 6mm (0.012 to 0.24") optional: 10mm (0.39")
Board transport direction	left-right optional: right-left	left-right optional: right-left	left-right optional: 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	156 twin tapes, 78 single tapes	212 twin tapes, 106 single tapes
Alignment principle	laser and camera	laser and camera	camera
Placement force	1.5 to 8N	1.5 to 8N	0.9 to 40N (lower forces on request)
Footprint (L x W) (incl. front side feeder trolleys)	3,720 x 1,705mm	2,760 x 1,705mm	1,852 x 1,810mm
Single-sided operation	yes	yes	yes

\* smaller on request

# A-Series features

			AX-501	AX-301	AX-201
Subsystem	Placement robot	Standard placement robot	■	■	
		Compact placement robot	■	■	
		Twin 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 feeder trolley with Jedec tray stacker		■	■		
A-Series tray trolley (tray feeding)				■	
Feeding	Tapefeeding	ITF 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	■	■	■

			AX-501	AX-301	AX-201
Feeding	Other	Carrier tape tray			■
		Stick feeding	■	■	■
		Tray stackers	■	■	■
		Stacked tube feeding			■
		Label feeding			■
		Re-use feeder	■	■	
		Device programming feeding (Data I/O)			■
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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