SMART SOLUTIONS

< 1 dpm
placement solutions

2013

A-Series

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

AX-301 and AX-501 have:

- Lowest defects per million placement solution: < 1dpm
- Industries highest production First Pass Yield
- Error free 01005 placement since 2002
- Scaleable output on same footprint
- Lowest cost per placement
- Lowest manufacturing costs
- No output de-rating from IPC9850
- Output predictability always within 5%
- 50% lower energy consumption than industry benchmark

Contents

The best value of ownership in high

70% lower rework costs

BE SAFE

Lowest defects per million (dpm) placement solution

Industries highest First Pass Yield for every component type and size

< 1 dpm placement solutions

Top quality products start by placing your parts with high confidence on the PCB. And that is exactly what Assembléon offers. With less than 1 defect on every million placements, you can save millions on rework, waste and warranty costs. Assembléon achieves world's best placement quality by:

- World class data preparation tools, including virtual sticky tape, graphical setup lists - your created program works first time right!
- Intelligent setup verification tools – no wrong components placed. The first board out of your system is right the first time!
- Unique single pick / single place concept – Optimized handling of the picked component.
- Component monitoring from pick up to place – reliable and repeatable placement quality and accuracy. No component spread.
- Advanced real-time board collision detection – the routine that avoids any impact force when the component touches the PCB
- ESD safe handling of your components.
- Proven best 01005 (EIA coding, 0402 Metric size) placement record since 2002!

World class data preparation

20% lower investment costs

TAKE CHARGE

Real scaleable solutions

True capacity on demand

Double your output

Seasonal influences

Whether you are a company that will grow volume, or a company that is subject to seasonal patterns, you would like to match your line output based on the output that is required. However, you do not want to add and remove capacity by adding and removing machines in and out of your production line.

Within the same floorspace the A-Series allow increase and decrease of capacity in small steps of 6,000 components per hour, so you will not overspend on unnecessary over-capacity. Ideal when you forecast output growth, or require equipment that matches capacity along with seasonal influences, where you can buy the basic required capacity and rent extra capacity only when it is required. This is really "True capacity on demand"!

100% output with all jobs

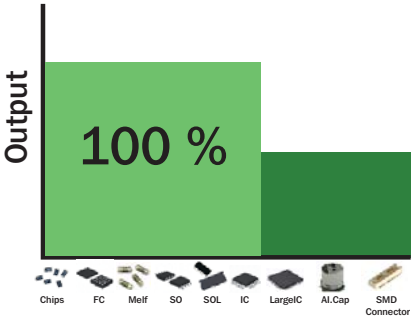
TAKE CHARGE

All jobs should have the best output

Best output over any job without reconfiguring your system

You should get the best output over any job, even the future ones you don't know about yet. Quite commonly you will purchase your line based on the output of an assignment, being a large volume product or a group of products. But what about the jobs thereafter, do you have to invest again to get the best out of your equipment or can you rely on your current setup.
The A-Series concept is just that: No matter the batch variation, its unique single pick / single place concept provides you with constant output, no matter the component type, that's it!

- Widest component range for one head type
- Only 7 nozzles for the complete range from 01005 to 45 x 45 mm – very few nozzle exhanges
- No changes in head configurations required over applications



> 95 % of your components at 100 % output

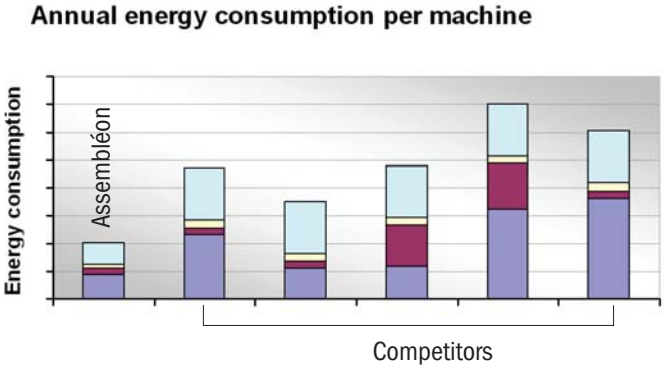
volume and product mix environments

50% lower energy costs

GO GREEN

Sustainable solutions

Be sure to produce today and tomorrow



The A-Series are built to last. Technology changes and you want to be sure that your investment can be used for many years. For over 15 years Assembléon has ensured that your equipment can be upgraded to evolve along with the latest in technology, whether this is 01005 placement, die placement, embedded placement or other future technologies (like the upcoming 008004 component).

Global consumption of energy, waste and CO_2 emissions are a concern of all of us and also for Assembléon. One of the key focus points of Assembléon is to make sure that SMT production is done with the least amount of energy consumption and the highest possible yield.

The A-Series concept of single pick / single place, specialized on high output / high accuracy is benchmarked against other industry concepts in the 100k output segment and has a remarkable 50% lower energy consumption. Producing green and saving money on your electricity bill as well !

100% Integration

TAKE CHARGE

Open NPI interface

Seamless integration into your NPI front-end application

Assembléon's open optimizer interfaces make it possible to connect to any front-end data preparation program. Assembléon has successful integrated its optimizers to front-end applications such as SMS international, Unicam FX and Mentor Graphics.

AEGIS UniCam FX iTAC SOFTWARE

100% Integration

TAKE CHARGE

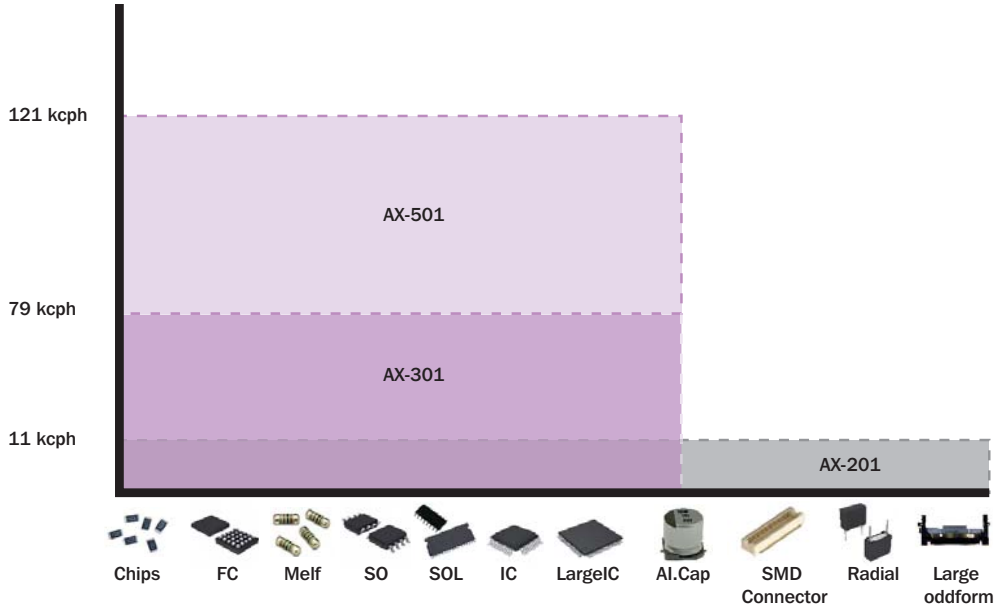
Open MES interface

Seamless integration to your factory's MES software

Assembléon uses very detailed performance~, process~ and traceability data interfaces using the IPC CAMX protocol (Computer Aided Manufacturing XML protocol). This protocol is based on a set of inexpensive to implement open communications standards. The CAMX files/messages are well structured and follow the international IPC standards 2541, 2546 and 2551. These standards are state-of-the-art and are gaining wide acceptance within the SMT Industry.
Assembléon has successfully integrated its data interfaces to MES system such as Mentor Graphics, SAP/Visiprise, Aegis, iTac and Optel (by Optimal Electronics).

A-Series

Output IPC 9850(A)



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 and IPC 9850A), making it an excellent solution for manufacturer's dealing with volume production, seasonality patterns, without compromising placement accuracy and quality.
The machines handle components from 01005 up to 45 x 45 mm fine-pitch with a placement accuracy down to 35 microns (laser) or 30 microns (camera), CpK >1. Moreover, the 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 1 dpm.

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

Linear drive 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 40 mm tall with placement forces as low as 0.9N.

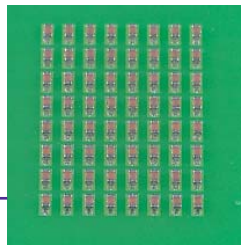
The AX-201 holds up to 212 feeding lanes and up to 60 Jedec trays per tray trolley (with a maximum of 4 tray trolleys for a total of 240 Jedec trays).

Component capabilities

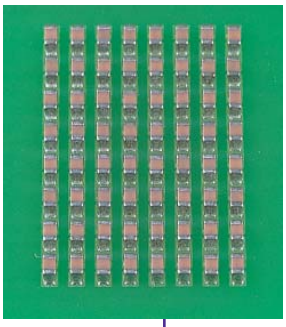
From 01005 to 130 mm odd-form

01005 chips

0201 chips



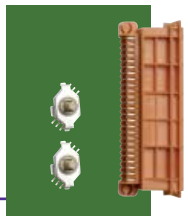
0402 chips

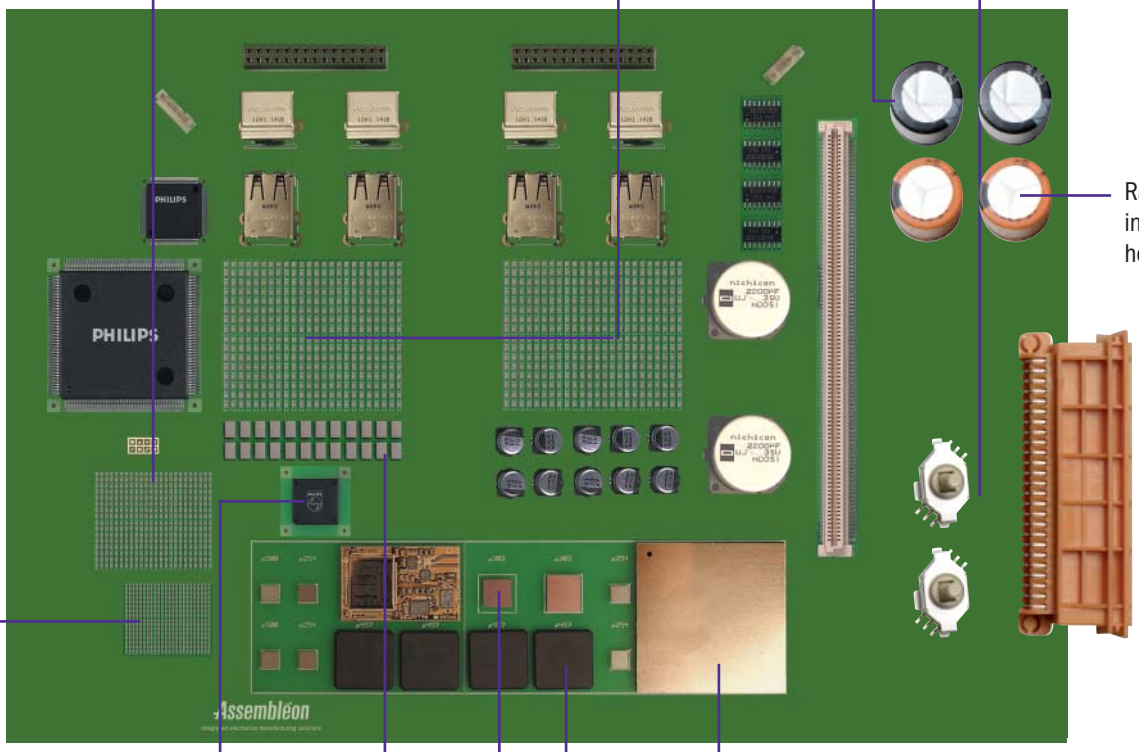


aluminium capacitor (up to 40 mm tall)

max. 130 x 79 mm odd-form components

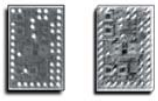
40 N snap-in force





Radial components including through hole check

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

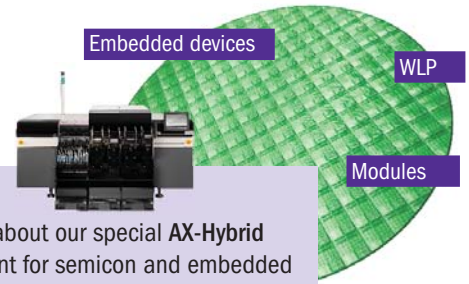


Flip chips
Bumpsize is down to 30 microns

Reverse side of BGA
Bumpsize is down to 30 microns

AX-501/AX-301

Scalable output, high first-pass yield



Enquire about our special **AX-Hybrid** equipment for semicon and embedded applications reaching 10µ accuracy and up to 21,000 cph flip chip placement rates.

	AX-501	AX-301
Maximum output per hour	165k	99k
IPC 9850/9850A output per hour	50k to 121k	30k to 79k
Placement quality	< 1 dpm	< 1 dpm
Placing accuracy at CpK>1	35 micron for chips 25 micron for QFP	35 micron for chips 25 micron for QFP
Component range	0.4 x 0.2 mm (01005) to 45 x 45 mm (01005 to 1.77 x 1.77”)	0.4 x 0.2 mm (01005) to 45 x 45 mm (01005" to 1.77 x 1.77")
Maximum component height - Optional	10.5 mm (0.41”) 12 mm (0.47”)	10.5 mm (0.41") 12 mm (0.47”)
Automatic toolbit exchange	nozzles	nozzles
Maximum board size (L x W): - Single lane standard - Single lane optional	 515 x 390 mm (20.28 x 15.35”) 800 x 457 mm (31.5 x 18”)	 475 x 390 mm (18.7 x 15.35") 800 x 457 mm (31.5 x 18")

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
- Up to 10 mm board thickness
- Zero board loading and unloading time
- Transport in two directions
- SMEMA or Japanese height

Placement robots

Standard

- 26 pick locations
- Application output typical 6,000 cph
- Fits 2 CPR positions

Compact

- 11 pick locations
- Application output typical 6,000 cph
- Doubles standard robot output

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

Placement heads

Laser vision

- Laser alignment on-the-fly
- Fiducial and artwork recognition
- 10.5 mm high components
- Programmable placement force 1.5 N - 8 N
- Automatic board warpage correction

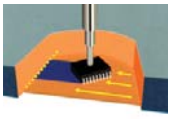
Single vision

- Fiducial and artwork recognition
- 10.5 mm high components
- 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
- 35µ accuracy



Camera alignment

- Components up to 45 x 45 mm
- Bumpsize down to 150 micron
- 3 different light types capable of aligning any component type
- 30µ accuracy on SPR
- 25µ accuracy on TPR

Camera alignment for flip chip

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

AX-201

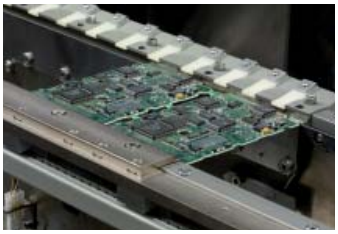
High placement accuracy, ultra wide component range

Maximum output per hour	15k
IPC 9850/IPC 9850A output per hour	9.3k (PH-DV) 6.3k (PH-HA)
Placement quality	< 1 dpm
Placing accuracy at 3 sigma	40 micron for chips 20 micron for QFP
Component range - Optional	1.0 x 0.5 mm (0402) to 130 x 79 mm (0402 to 5.12 x 3.11”) 0.4 x 0.2 mm (01005) to 0.6 x 0.3 mm (0201)
Maximum component height	40 mm (1.57") (25 mm over 25 mm)
Automatic toolbit exchange	nozzles, grippers
Maximum board size (L x W): - Standard - Optional	 515 x 460 mm (20.28 x 18.11") 800 x 460 mm (31.5 x 18.11”)

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 for up to 4 components
- Programmable placement force range of 2 N - 8 N
- Maximum component height 10,25 mm

High accuracy

- Fiducial and artwork recognition
- Simultaneous alignment for 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

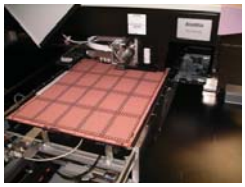
- 30 pallets
- Up to 60 trays (JEDEC size)
- Replenishment on-the-fly
- High speed tray cache positions
- Max. 4 tray trolleys on AX-201

Options and accessories

(for all equipment unless stated otherwise)

Tape cutters:

- Decreases waste volume by 80 %
- Only cuts when feeding is active



(AX-501, AX-301)

Large boards

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

Dip station

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

(AX-501, AX-301)

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

Please refer to AX-Hybrid brochures for reaching even more accuracy for your semicon and embedded applications.

(AX-201)

Gripper

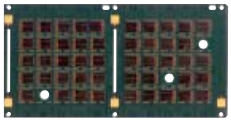
- Can pick and place a large variety of odd-form components
- Custom grippers available on request
- Kit available to make own gripper design

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

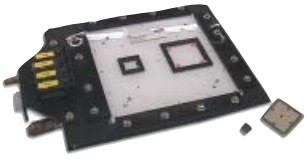
A-Series vision tool

- Simple tool for offline preparation of component vision files

(AX-501)

Second user-interface

- Increases operator efficiency



Accuracy and placement force verification sets

- Simple, closed-loop processes

Multi-language support

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

Feeding options

Intelligent tape feeder (ITF3)

- From 4 mm to 88 mm tapes
- Supports W4P1 tape standard for reliable 01005 feeding

Single tray feeder (Jedec tray station)

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

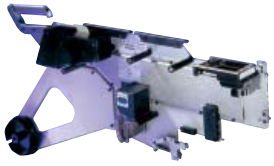
Twin tape feeder 8 mm (TTF)

- Doubles the capacity of 8mm tapes

(AX-201)

Manual tray

- Fits up to 2 JEDEC trays



(AX-201 on request)

Label feeder

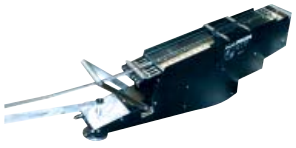
- For feeding pre-printed labels

(AX-201 on request)

Horizontal tube feeder

- For odd-form components supplied in tubes

Stick feeder



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

(AX-201 on request)

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)

Carrier tape tray

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

Feeder service tools

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

(AX-201)

Tray trolley

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

Feeder storage carts

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

(AX-501, AX-301)

Splice detection

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

Tape splicing tool

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

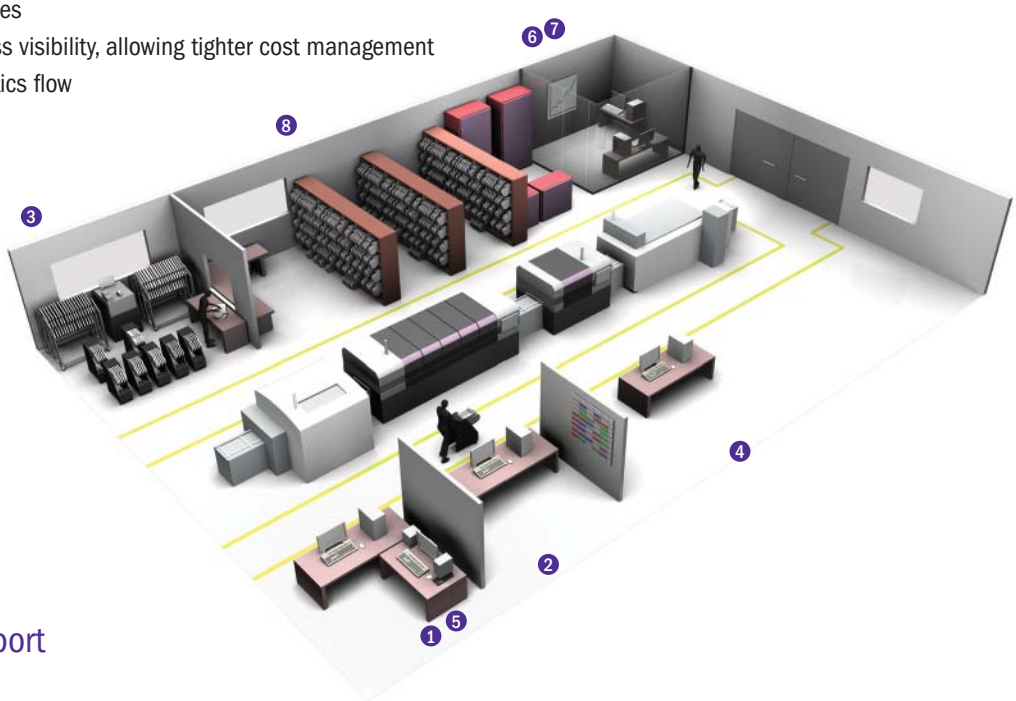
Factory integration
Optimize your SMT production line's performance

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

Our open data interfaces also connect to SMS international, Aegis, Unicam FX, Mentor Graphics, SAP/Visiprice, iTac, Optel and others.



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 and multiple lines and balancing load 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 and shorten production rampup time
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** – performance analysis data to efficiently monitor systems
8. **Parts warehousing** – reporting component usage to assist inventory control

NPI Solutions

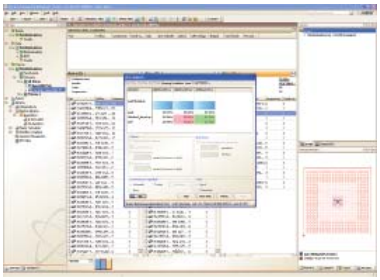
Grouping, planning, scheduling

Intelligent grouping and scheduling of (many) programs, minimizing the total number of setup changes and feeder changes and balancing loads over multiple lines.

Features:

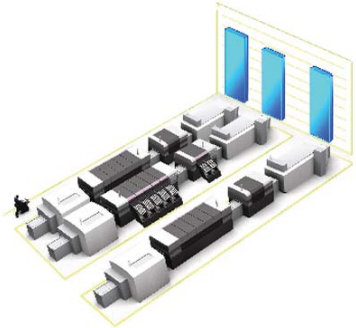
- Groups thousands of programs in just seconds
- Schedules according to line application capability
- Single line or multi-line (option) grouping capabilties
- Schedule start or stop time of production
- Connects to ERP to check for sufficient parts to produce jobs (project solutions)
- Easy drag and drop shifting of groups
- Partly combined setup, fix and group feeders that are common with multiple grouped setups

Front-end data preparation



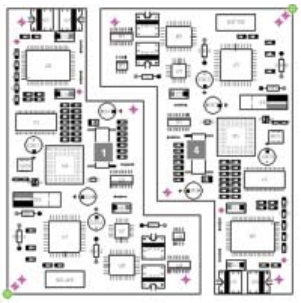
Pre-defined or custom defined workflows, managing in a one screen overview the correct steps from bringing Cad and BOM data to an error free production program.

Optimizers and balancers



World class balancers for Assembléon iFlex, A-Series and A-Series Hybrid equipment, generating programs with a production cycle-time predictability within 5%.

Gerber input and gerber reverse engineering

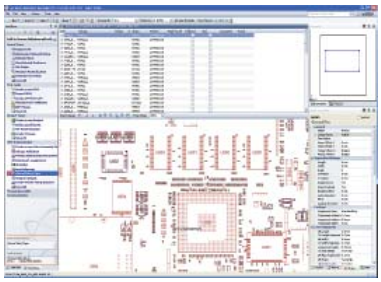


The fastest route from Gerber data to Centroid data

Used when maintaining current products or replacement parts of older products that are created on obsolete CAD systems. Also when PCB layouts are transferred from one manufacturing platform to another.
Reverse Gerber engineering takes the Gerber artwork, builds intelligent format that can be read by CAD systems to ensure a perfect match with the original PCB layout.

NPI Solutions

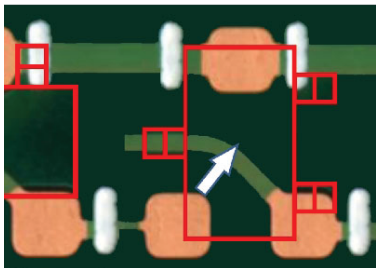
CAD importer package



Our front-end data preparation software is capable with working with the world's most leading CAD software manufactures. It standard supports the following leading formats (others on request):

- Altium desinger
- Altium P-CAD
- Allegro
- OrCAD Designer
- OrdCAD Layout
- Mentor Board Station
- Mentor Power PCB
- PADS Perform
- PDIF
- Zuken Cadif
- Zuken PWS
- Zuken BD

Virtual sticky tape

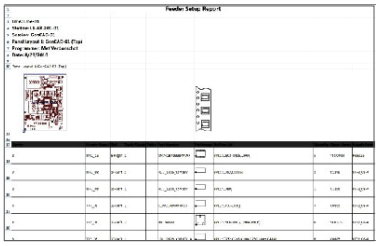


Virtual offline placement program simulation - verify and correct that your placement program is 100% error free.

Virtual sticky tape guides you throught a virtual 'real' production run. CAD layers or an image of the PCB can be displayed as background. Virtual sticky tape checks and corrects:

- X and Y offset
- Rotation
- Polarity
- Pin-1 location
- Shape

Feeder setup lists



Setup lists meant for operators.

A clear graphical feeder setup list is generated. As an extra quality check, a graphical parts orientation is shown on how the part should been orientated in its package.

Open NPI interfaces

Mentor Graphics

UniCam FX

SMS

Seamless integration into your NPI front-end application.

Assembléon's open optimizer interfaces make it possible to connect to any front-end data preparation program. Assembléon has successful integrated its optimizers to front-end applications such as SMS international, Unicam FX and Mentor Graphics.

MES Solutions

Setup verification

Setup Assistant Offline

Setup Assistant Online

Error free setups and changeovers - offline and online

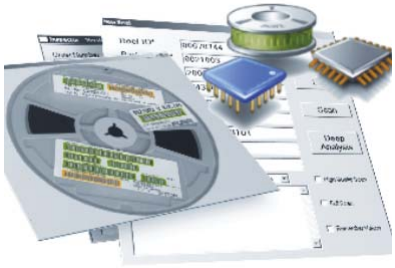
Assembléon's setup verification takes care of fast and error free offline setups as well as setups on the machine as well as offline. Your pick and placement equipment is prevented from producing with a wrong setup. It checks and monitors continuously on:

- Correct trolley and feeder locations
- Correct part on feeder (within feeding intelligence)
- Remaining part count
- Reel expiration dates
- Just-in-time second source parts (checking and validation)
- Feeder insertion and removal (and possibly a forced re-scanning of materials if required)

Furthermore it provides data for:

- Parts, quality check & chuck & consumption management
- Traceability
- Feeder maintenance monitoring
- Partly combined setup, fix and group feeders that are common with multiple grouped setups

Material management



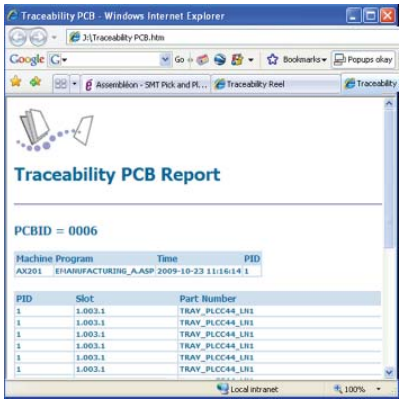
Incoming material registering, material managment and material consumption database for connection to warehousing software

This software registers incoming material, which can be labeled with unique IDs. Unique material ID is a basis for fail save traceability data. The database of registered material is connected to your machines in the factory and for every component that is picked from the feeder, the quantities in the material database are updated. This information can be used to connect to a parts warehousing system.

The material verification further manages the following quality aspects:

- RoHs compliancy
- Approved vendors
- Component blocking
- Moist Sensitive Device control and management

Material traceability



Reduce the total cost of production, including costs of the total product lifecycle such as warranty, recalls and repair

When assembling at the lowest possible costs, the total cost of production, including costs of the total product lifecycle such as warranty, recalls and repair, should be taken into account. Traceability solutions take care of tracking, tracing and control, and are an essential element of success in achieving these objectives. Traceability solutions are designed to achieve optimal use of materials and resources throughout the manufacturing process.

Traceability is offered in two different levels:

- Work order traceability, which is linked to work order numbers
- PCB traceability extends the traceability data from work order traceability down to reference designator traceability
  PCB traceability is full traceability down to a reference designator or circuit level

MES Solutions

Performance monitoring

Performance monitoring is to get the best performance out of your equipment through monitoring and identifying your line bottlenecks. Performance monitoring contains a line monitor and changeover dashboard.

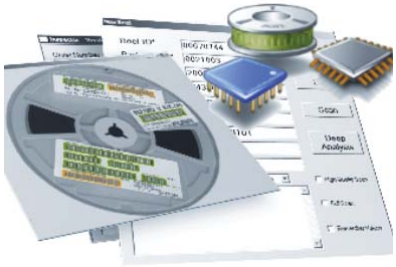
Monitoring dashboard facts:

- Improve machine and line performance by identifying the bottleneck equipment in the line for the operators and identifying where productivity is wasted caused by machine errors.
- Follow up and remove reasons for performance drops. Minimize material waste and scrap

Changeover dashboard facts:

- Identifies deviations from your changeover targets and investigates reasons for drops in change-over performance.
- Initiates follow-ups on change-over improvements

Feeder maintenance monitoring

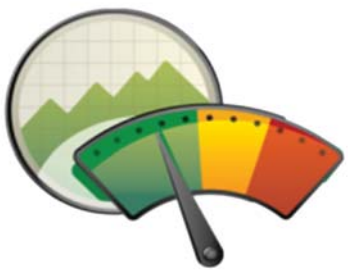


Improve your line efficiency by top shape feeder and control your feeder inventory through short maintenance and repair cycle times.

Feeder maintenance monitoring allows feeders to stay in top shape and therefore in top performance. By defining a fixed maintenance interval that suites your production environmental conditions, feeders are identified on the system or offline loading unit that their maintenance is due. The software can also be connected to in-house feeder service tooling, making sure feeders are back on your production line in no-time.

Open MES data interfaces

Performance data interface



The performance data that is exported can be categorized in the following categories (main items, but not limited to):

- machine status
- active program name
- board-count and status
- pick-count and placement-count per head
- feeder-position and packagetype
- feeder-events
- PPM-levels
- error-events
- feedback on consumed components per reel based on unique ID of that reel
- component consumption per PCB
- toolbit PPM report per PCB
- PPM PCB report

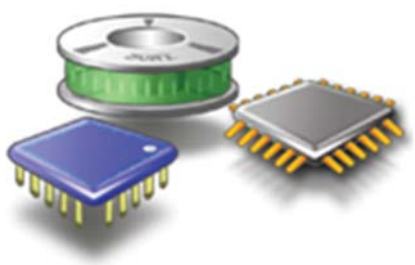
Traceability data interface

Allows the customer to trace back which parts (from what reel) were used to produced a specific PCB

- Detailed Job level traceability
- Detailed board level traceability (electrical reference designator level)

Traceability supports disabled circuits, alternate feeders and accurate tape splicing.

Material consumption interface



Real-time recording of each and every pick, allowing connections to parts management software or parts warehousing software.
By managing just-in-time delivery of parts to the production line, it prevents stopping of production due to to-late part supply and it prevents the an excess of parts on the production floor; lowering your overall costs of parts in store.

Key functions:

- Real-time feeder index monitoring and parts consumption registering
- Real-time feeder insertion and removal detection for decision making procedures

Seamless integration with MES software

Seamless integration to your factory's MES software

Assembléon has successful integrated its data interfaces to MES system such as SAP/Visiprise, Aegis, iTac, Mentor Graphics and Optel (by Optimal Electronics).

A-Series specifications

	AX-501	AX-301	AX-201
Max. output per hour	165k	99k	15k
IPC 9850/9850A output per hour	30 to 121k	79k	9.3k
Placement quality *	< 1 dpm	< 1 dpm	< 1 dpm
Placement accuracy at cpk>1.00 *	35 micron for chips 25 micron for QFP	35 micron for chips 25 micron for QFP	35 micron for chips 20 micron QFP
Component range - minimum - maximum - optional	0.4 x 0.2 mm (01005) to 45 x 45 mm (0.016 x 0.008" to 1.77 x 1.77")	0.4 x 0.2 mm (01005) to 45 x 45 mm (0.016 x 0.008" to 1.77 x 1.77")	1.0 x 0.5 mm (0402) to 130 x 79 mm (0.039 x 0.019" to 5.12 x 3.11") 0.4 x 0.2 mm to 0.6 x 0.3 mm
Maximum component height: - Optional	10.5 mm (0.41") 12 mm (0.47")	10.5 mm (0.41") 12 mm (0.47")	40 mm (1.6")
Automatic toolbit exchange	nozzles	nozzles	nozzles, grippers
Maximum board size (L x W): - Single lane standard - Single lane optional	515 x 390 mm (20.28 x 15.35") 800 x 457 mm (31.5 x 18")	475 x 390 mm (18.7 x 15.35") 800 x 457 mm (31.5 x 18")	515 x 457 mm (20.3 x 18") 800 x 457 mm (31.5 x 18")
Minimum board size (L x W): - Standard - Optional	50 x 50 mm (2 x 2") 50 x 25 mm (2 x 1")	50 x 50 mm (2 x 2") 50 x 25 mm (2 x 1")	50 x 50 mm (2 x 2") 50 x 25 mm (2 x 1")
Board thickness: - Standard - Optional	0.3 to 6 mm (0.01 to 0.24") 10 mm (0.4")	0.3 to 6 mm (0.01 to 0.24") 10 mm (0.4")	0.3 to 6 mm (0.01 to 0.24") 10 mm (0.4")
Board transport direction: Optional	left-right right-left	left-right right-left	left-right right-left
Board transport height	SMEMA (940 - 965 mm) and Japanese (885 - 915 mm)	SMEMA (940 - 965 mm) and Japanese (885 - 915 mm)	SMEMA (940 - 965 mm) and Japanese (885 - 915 mm)
Feeding positions	260 twin tapes 130 single tapes	156 twin tapes 76 single tapes	212 twin tapes 106 single tapes
Placement force	1.5 to 8 N	1.5 to 8 N	0.9 to 40 N
Footprint (L x W) (incl. front side feeder trolleys)	3,720 x 1,705 mm (146.46 x 67.13")	2,760 x 1,705 mm (108.66 x 67.13")	1,852 x 1,810 mm (72.91 x 71.26")
Single-sided operation	yes	yes	yes

* based on actual field data, all data measured at similar conditions

A-Series features

			AX-501	AX-301	AX-201
Subsystem	Placement robot	Standard placement robot	■	■	
		Compact placement robot	■	■	
		Twin placement robot	■	■	
		Linear H robot			■
	Placement head	Laser vision (laser + camera align)	■	■	
		Single vision (camera align)	■	■	
		Dual vision			■
		High accuracy			■
	Camera	Component vision LFOV	■	■	■
		Component vision SFOV			■
		Component vision XSFOV	■	■	
Trolleys	Trolleys	A-Series feeder trolley	■	■	■
		A-Series feeder trolley with Jedec tray stacker	■	■	
		A-Series tray trolley (tray feeding)			■
Feeding	Tape feeding	TTF 8 mm, 13" reel or 7” reel	■	■	■
		ITF3 4 mm, 7” reel	■	■	■
		ITF3 8 mm, 13" reel	■	■	■
		ITF3 12 mm, 13" reel	■	■	■
		ITF3 16 mm, 13" reel	■	■	■
		ITF3 24 mm, 13" reel	■	■	■
		ITF3 32 mm, 15" reel	■	■	■
		ITF3 44 mm, 15" reel	■	■	■
		ITF3 56 mm, 15" reel	■	■	■
		ITF3 72 mm, 15” reel	■	■	■
		ITF3 88 mm, 15” reel	■	■	■
	Other feeding	Carrier tape tray			■
		Stick feeding	■	■	■
		Tray stackers	■	■	■
		Stacked tube feeding			■
		Label feeding			■
		Re-use feeder	■	■	
		Device programming feeding (Data I/0)			■

		AX-501	AX-301	AX-201
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)	■	■	■
	Bad mark transfer	■	■	
	Multi-level badmark reading	■	■	■
	Adaptive pick	■	■	■
	Alternative feeder function	■	■	■
	Graphical online help function	■	■	■
	Management information system	■	■	■
	Online program editor	■	■	■
	Online teach wizards	■	■	■
	CAMX Support	■	■	■
	Mark recovery wizards	■	■	■
	PPM level warnings	■	■	■
	Component replenishment	■	■	■
	Multiple cockpit views	■	■	■
	Package on package	■	■	■
	Fiducial mark editors	■	■	■
	PCB collision detection	■	■	■
	Reel-time closed loop replacement force detection	■	■	■
	Blueprint placement proces	■	■	■
	Remote feeder index control	■	■	■
	Initial pick camera verification	■	■	■
	Accuracy class edit	■	■	■

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