JUKI®

High-speed Flexible SMT Placement System

High-speed chip shooter

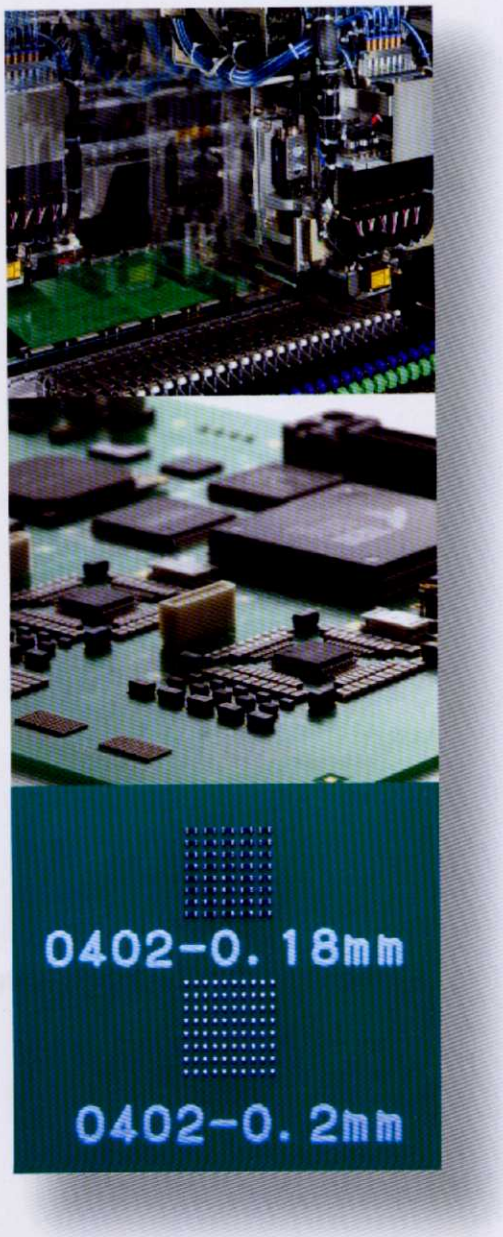
KE-2070

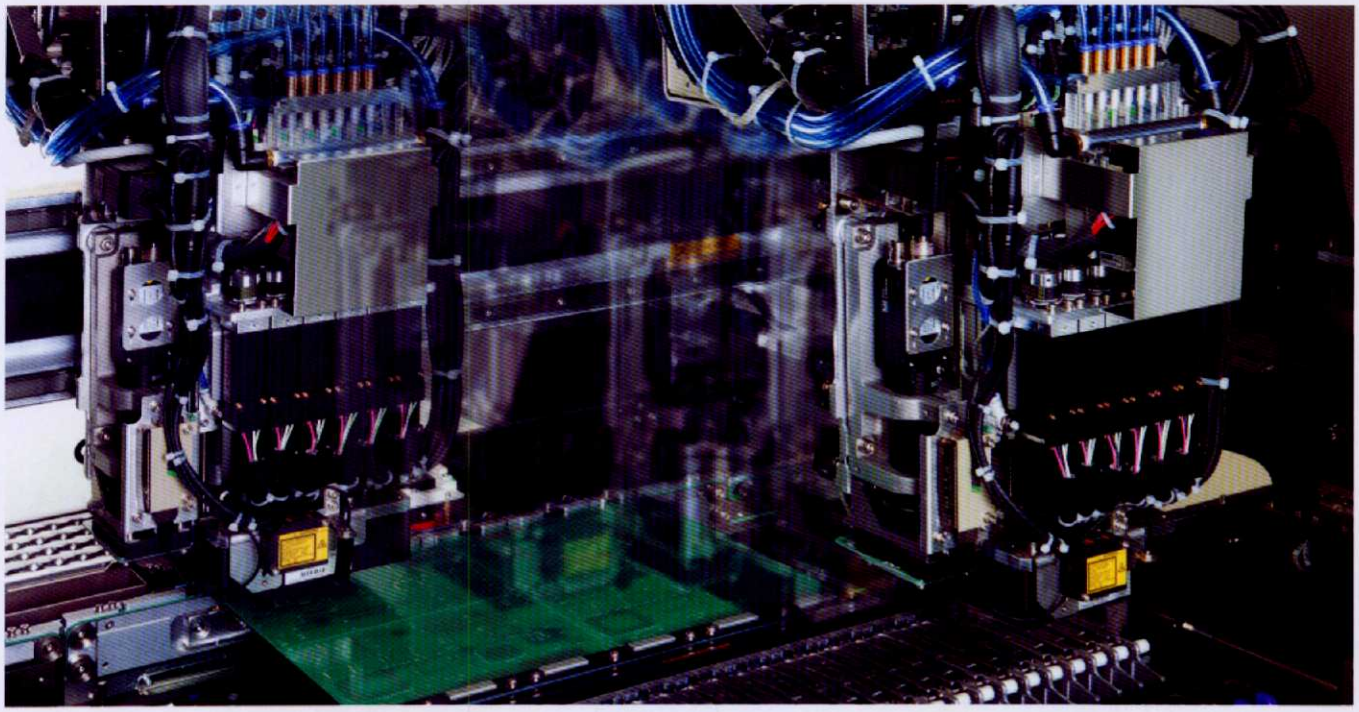
High-speed flexible mounter

KE-2080

High-speed modular mounter

FX-1R

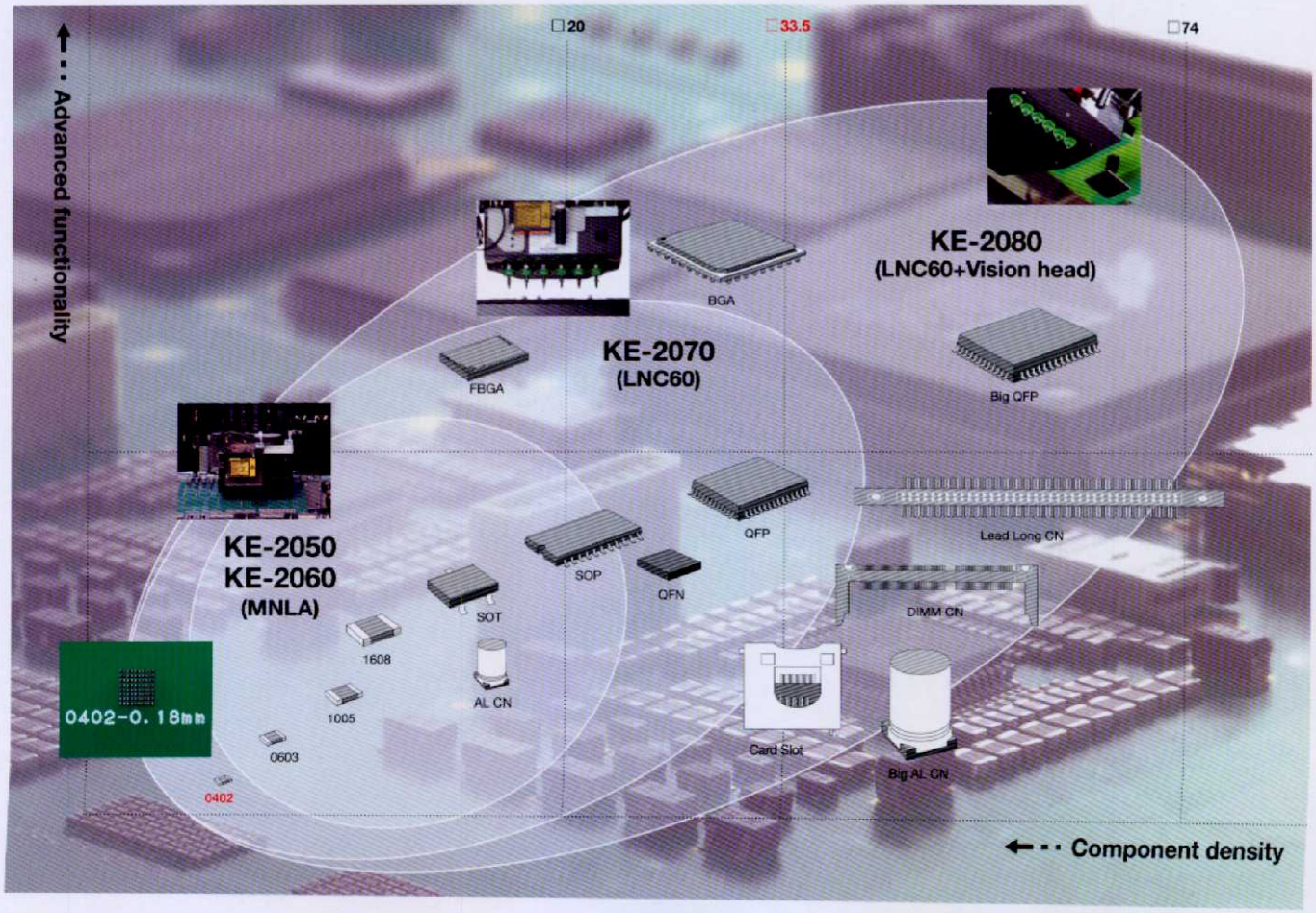




High reliability platform combined with high speed.
JUKI, pioneer of "modular" introduces
Ultra flexible mounters for today's advanced production requirements

KE-2070 and KE-2080, now available!!

The KE series meets the needs of a wide variety of applications with the highest performance.
High-speed, high-accuracy component centering using unique laser technology and powerful vision processing.

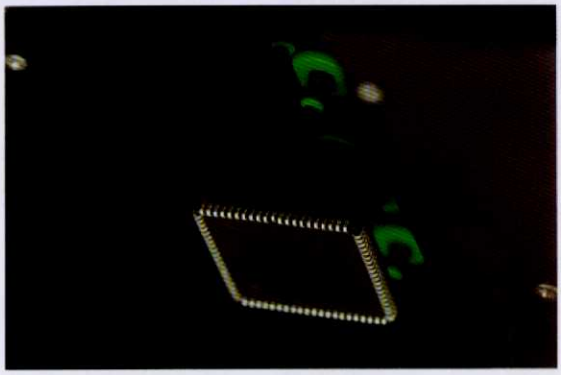


High area productivity and wide component range

New laser sensor: LNC60

A 20% improvement in throughput in the same footprint

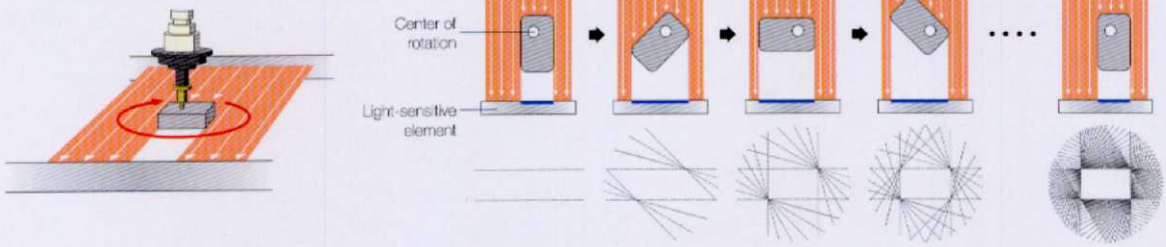
The new LNC60 laser head is capable of picking and centering 6 components simultaneously. It can reach speeds of up to 16,000 CPH (IPC-9850), a 20% improvement over the previous generation.
A variety of different nozzles can be attached at the same time, decreasing the nozzle change time. With the optional MNVC (multi-nozzle vision centering), the throughput for high accuracy devices is increased a remarkable 40%.
And all of these features are found in a remarkably compact machine for unparalleled productivity.



Unrivaled placement range from 0402 (01005) to 33.5mm square components

The LNC60 brings a new concept in laser centering to the market. This sensor has the unique ability to center components from 0402 (01005) to 33.5mm square parts. From ultra-small, ultra-thin, chip-shaped parts to small QFP, CSP, BGA, a wide range of parts can be mounted by the laser recognition system at high-speed and with high-accuracy.

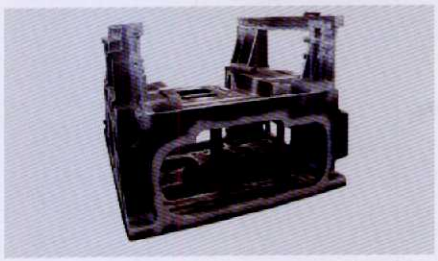
LNC60 A new concept in component centering that is capable of on-the-fly centering of 6 components simultaneously.



Tangential Line Centering™ achieves both a wider component range and higher accuracy all at the same time. The LNC60 accurately measures the component's center, dimensions, and angular correction all in a single sweep. The optical design has been simplified to give higher reliability in a thinner and lighter package.

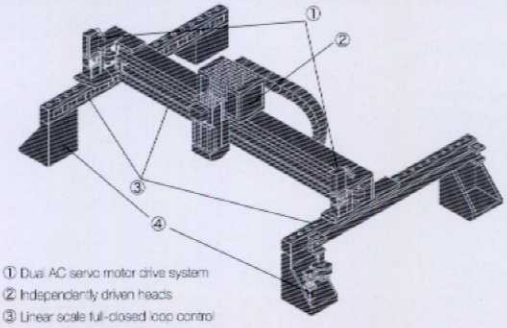
Incomparable stability created by advanced basic design

Ultra-rigid frame



A high-rigidity frame made by cast metal molding integrates the Y axis frame. It has excellent anti-vibration characteristics that support high-speed operation.

Dual XY drive system & independently driven heads



① Dual AC servo motor drive system
② Independently driven heads
③ Linear scale full-closed loop control
④ Dual AC servo motor drive system

X-Y drive system features JUKI's original "Full closed loop control" using AC motors and magnetic linear encoders. Dual motor drive of both X and Y achieves high-speed, and highly reliable placements unaffected by dust and temperature variations. Independent Z and θ motors improve accuracy and robustness.

From high-speed, high-accuracy mounting of very small parts to handling of odd-shaped parts

Ultra-flexible performance assures the best return on investment for any application

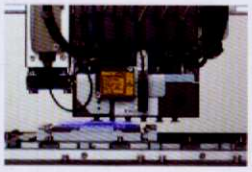
High-speed chip shooter

KE-2070

Laser centering LNC60 | Vision centering (option)

A chip mounter optimal for high-speed mounting of small parts. With the addition of the optional MNVC, the component range can be increased even more for greater flexibility.

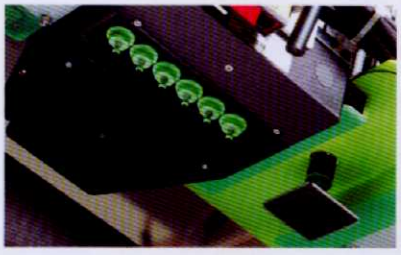
- ◎16,000CPH: chip (laser centering / IPC 9850)
- ◎4,600CPH: IC (vision centering with optional MNVC)
- ◎One multi-nozzle laser head (6 nozzles)
- ◎From 0402 (01005) to 33.5mm square components
- ◎Vision centering system (optional, featuring bottom, side, and back lighting, all ball recognition)



High-speed flexible mounter

KE-2080

Laser centering LNC60 | Vision centering | High resolution head



The best flexible placement system for high-density placements. The ultra-flexible KE-2080 can place a wide range of components from 0402 (01005) and ICs, to odd-form, all at industry leading accuracy and speed.

- ◎15,400CPH: chip (laser centering / IPC9850)
- ◎1,850CPH: IC (vision centering / effective tact), 4,860CPH with MNVC option.
- ◎One multi-nozzle laser head (6 nozzles) plus one high resolution head (1 nozzle)
- ◎From 0402 (01005) to 74mm square components or 50×150mm
- ◎Vision centering system (featuring bottom, side, and back lighting, all ball recognition and split recognition)

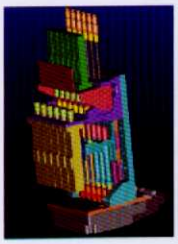
※ Actual throughput may vary.

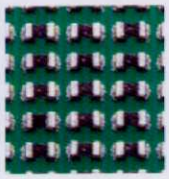
High-accuracy technology for "ultra-small" 0402 (01005) chip

▶Accurate

Highly reliable head unit and high-resolution axis control

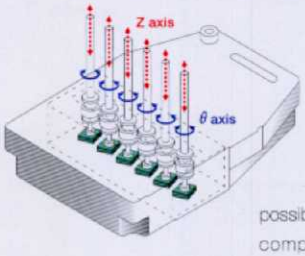
The head unit has a laser sensor and control system for Z and θ motors designed for efficiency and ease of maintenance. High speed serial communication is used for data transfer. The simple design reduces the number of cables, even with the increased number of nozzles, and increases reliability.





Improved resolution on all axes results in more accurate placements, time after time. The KE-2070 and KE-2080 feature 1 µm linear encoders on the X and Y axes. New encoders employed for the Z and θ axes have a resolution of 260,000 pulses per revolution, a significant improvement in precision. These enhancements combined result in an improvement of the placement accuracy to ±50µm (Cpk ≧ 1)

Independent Z / θ control

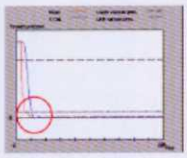


Each nozzle has independent Z and θ motors for high reliability and high accuracy. Precise control of each nozzle is possible without affecting components on other nozzles.

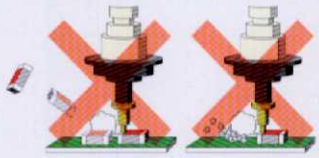
▶High quality

No-blow placement technology

JUKI's original vacuum self-calibration function eliminates the need for a vacuum "blow-off" during placement, which can disturb neighboring components or solder paste.



High density placement without "blow-off"



Possible effects of "blow-off"

Highly versatile vision system for a wide range of components

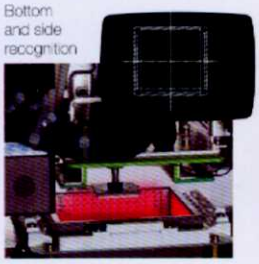
▶Flexible

Vision centering technology

Centering method can be selected based on component type, shape, size and material. Laser centering is used for high speed placement of smaller components. Vision is used when lead or ball inspection is needed or when the component is too large for the laser. Many nozzles are available for odd-shaped components providing unsurpassed component handling.

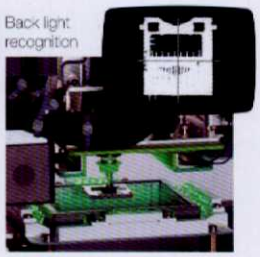
Nozzles for odd-shaped components

Bottom and side recognition



Bottom and side recognition

Back light recognition



Vision recognition

General Vision

General vision function is used to support a wide variety of today's unusual vision centered components. After programming is complete, the data can be verified by picking and test centering a component.

▶High speed vision placement

MNVC (Multi-Nozzle Vision Centering)

Vision centering by the multi-nozzle head nearly doubles the placement rate for smaller components, including CSPs, BGAs, and smaller QFPs. (Option)

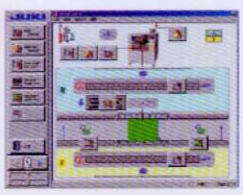
※MNVC is also available on the KE-2070.

User-friendly design

▶Ease of operation

Graphical user interface

Easy to use and easy to learn programming and operations make the KE series a great choice for new or experienced operators. Add the optional touch panel or rear side operation panel for even greater convenience.



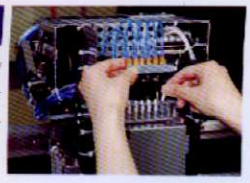
Operation unit

Familiar Windows XP software is as easy to use and the PC on your desk. A new USB 2.0 port simplifies the transfer of production files and other data between machines.

▶Easy maintenance

New head unit design

The head unit is designed specifically for easy maintenance. Vacuum filters have been moved for better access and require no adjustments or calibrations after replacement.

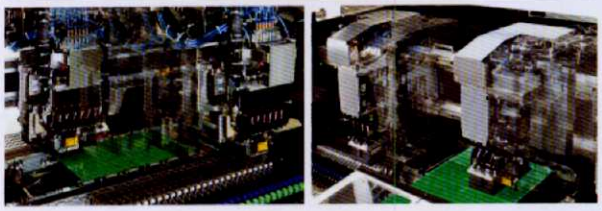


JUKI original technology for high-density placement

Laser centering technology

▶High accuracy, high-speed mounting

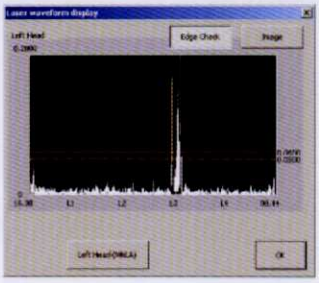
High-speed, on-the-fly centering



A high resolution laser is mounted on the head to center components in all directions including angle. Centering is done on-the-fly, allowing high speed placement of components from small chips to SOPs.

▶High reliability

Centering errors prevented by self check



Laser contamination is checked prior to the production. If contamination is detected, an alarm is given to prevent centering errors.

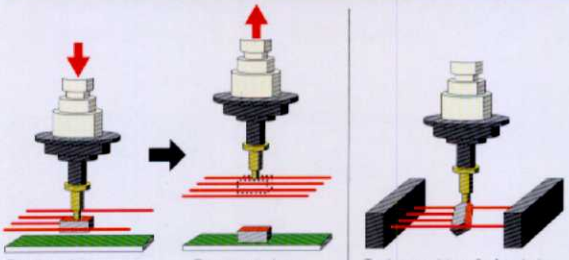
▶Adaptable centering

Centering accommodates component variations

Laser centering measures the components on the side. It is not affected by variations of component color or width / length so, unlike vision centering, there is no need to edit component data for different component vendors.

▶Low loss ratio

Component check function improves placement reliability



Presence of component is monitored until just before placement.

Component release confirmed after placement.

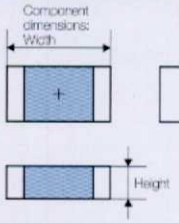
Tombstone pick easily detected.

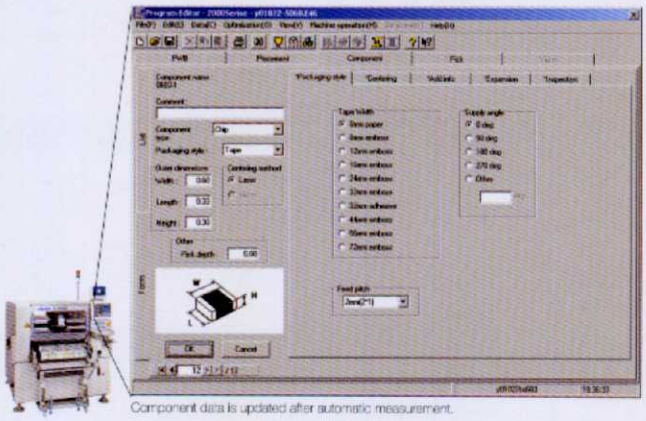
Since the laser is mounted on the head, it can be used to monitor the presence of components the entire time from pick to placement. This is difficult to accomplish with vacuum detection only. The placement reliability is also improved because the release of the component is confirmed after placement.

▶Simplified data entry

Ease-of-use improved by automatic component measurement

Component data can be completed entering just approximate dimensions, type and packaging information. The exact dimensions and lead count / pitch are measured by the machine and automatically entered into the component data.





Component data is updated after automatic measurement.

Modular concept introduced by JUKI in 1993

Our products continuously evolve to meet the needs of the ever-changing SMT industry.

Economical + **Easy to use** + **Expandable** =

Economical

Flexible machine modules can be configured in a wide variety of lines to meet the exact production needs with minimal investment.

Easy to use

Simple software layout, graphical interface, and intelligent mechanical design make the machines easy to use and easy to maintain.

Expandable

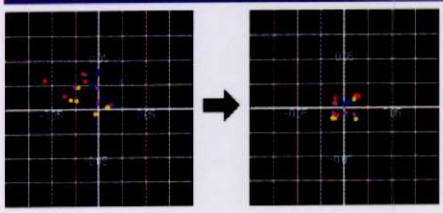
Machines can easily be added or removed from a line to suit changing production requirements. Re-balancing and optimization of production files takes just seconds. Compatibility of software and feeders makes it easy to add new machines to existing assembly lines.

EXPANSION

Advanced features for increasingly sophisticated and diversified applications

▶High quality

FCS (Flex Calibration System)



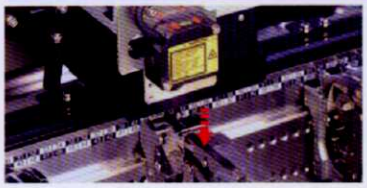
JUKI's highly regarded easy maintenance just got even easier! The optional FCS calibration jig is a simple to use system to re-calibrate placement accuracy. The machine automatically picks and places jig components, then measures the error and adjusts all necessary calibrations. (optional)

▶Fast and easy setup, Low defect ratio

Auto Teaching of Pick Position

Auto teaching of pick position reduces changeover time and mis-picks.

HMS (Height Measurement System)



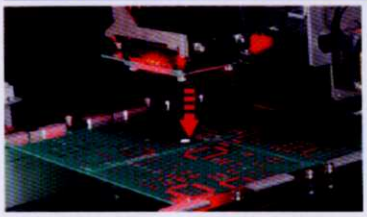
The HMS is used to quickly and accurately measure the component pick height. A laser sensor measures the distance instantly without any physical contact.

▶Flexible

Fiducial recognition

OCC lighting system supports wide variety of board materials including FPC (Flexible Printed Circuit board). Programmable brightness and directional lighting improves fiducial recognition.

Camera Bad Mark Detection



Bad mark detection is performed using the machine's standard downward looking camera (also used for fiducials and teaching).
This system accurately detects a wide range of marks on various substrates, including flex circuits.

▶Maximum throughput

Simultaneous Pick Priority Mode

Users can now select the best pick mode to suit their production requirements. For the maximum possible throughput, simultaneous pick priority mode will try to pick as many components as possible in a single pick sequence.

▶High density placements

Pick Position Priority Mode

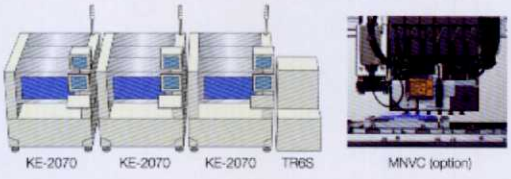
For high density component placement, pick position priority always picks components at the taught pick location.

Sample production line with FX and KE series

Compact line for small electronics

High density placement / High-speed, highly accurate placement of small components including fine pitch or odd-shaped devices

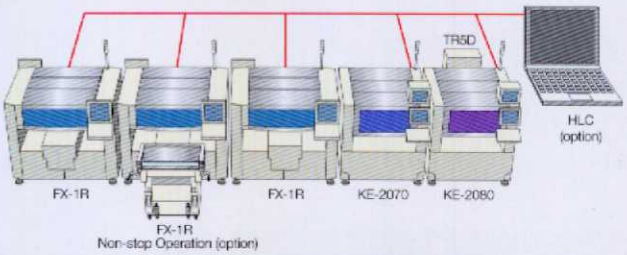
The KE-2070 is ideal for applications with only smaller components. The MNVC option can be easily added to increase the flexibility of the KE-2070 even further.



High speed, general use line

High throughput / Place virtually any SMT component

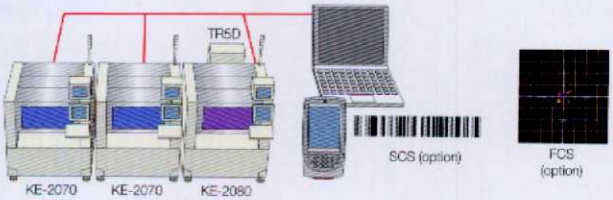
Full-function high speed line with the ability to place all components from small chip to large BGAs, QFPs and connectors. Non-stop Operation allows feeders to be changed on-the-fly without stopping the machines. Productivity is maximized using the HLC (Host Line Computer) for line balancing and optimization.



Quality control line for automotive or medical applications

Setup verification / Traceability / Small lot, high changeover production

Designed for situations where verification and product traceability are required. FCS (Flex Calibration System) to perform periodic recalibrations or accuracy certification. Traceability to record lot number/manufacturing codes of components placed on all boards. Setup Control System (SCS) to verify feeder setup prior to production and new reel replacement during production.



Advanced linear motor and unique HI-Drive system delivers higher placement speed

High-speed modular mounter

FX-1R

Laser centering

MNLA

The FX-1R is a traditional modular chip shooter driven at extreme speeds. Refinements in the drive system deliver real world improvements in actual throughput.

- ◎33,000CPH: chip (optimal) / 25,000CPH: chip (IPC 9850)
- ◎Two independent multi-nozzle laser heads (8 total nozzles)
- ◎From 0603 (0201) to 20mm square components or 26.5×11mm
  0402 (01005) option factory installed.

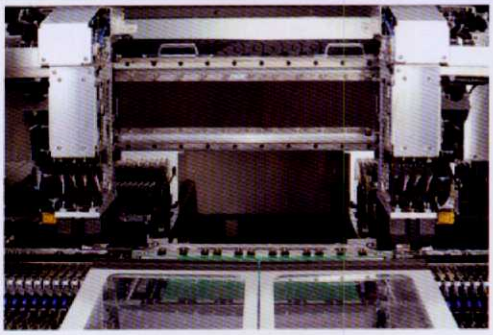
※Actual throughput may vary.

Technology for high speed placement

Linear motor

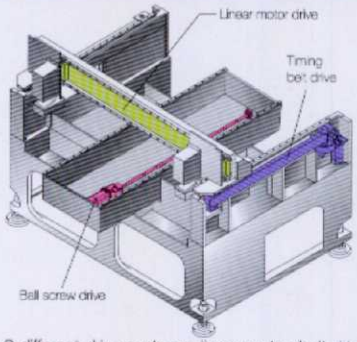
▶High reliability

Linear motor technology



A linear motor is used for the X axis for higher reliability and lower maintenance. Linear motors require fewer structural parts such as pulleys or supports and require no maintenance. In addition, they are quieter and do not induce as much vibration as other drive systems.

The right technology for the application



The FX-1R uses 3 different drive systems: linear motor, belt drive and ball screw. Why? Because each is best suited for different applications. Belt drive is used for the heavy movement of the Y axis. A ball screw is used for the short frequent movement of the PWB table. And the linear motors are used for the X axis to reduce weight and improve performance. As technology continues to evolve, you can count on JUKI to use the best technology for every application.

User-friendly operation

▶Ergonomics

Operation unit

Keyboard and monitor easily adjust in height and angle for operator convenience. The new HOD design incorporates an LCD display for the top vision camera. Teaching fiducials or pick positions has never been easier!

Flexible operation unit

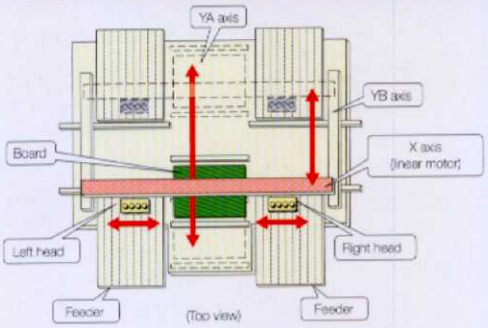
HOD with LCD

Unique design for highest efficiency

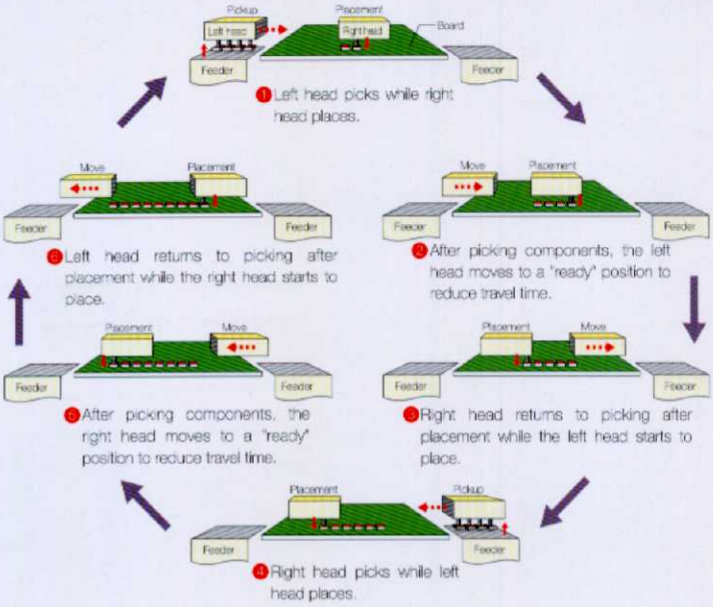
HI-Drive

▶Productivity

HI-Drive

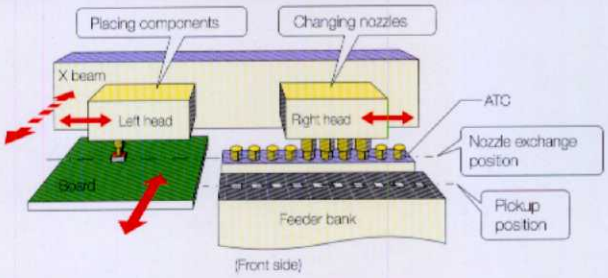


The new HI-Drive system is designed for high speed placement of smaller SMT components (from 0603 (0201) to 20 x 20mm). The HI-Drive has 2 Y motors moving the X beam. Two heads mounted on the X beam, each with 4 nozzles, are moved by a single linear motor. During production, one head picks while the other head places. The heads alternate picking and placing until production is completed on the front of the machine. The heads and PWB then move to the rear (if necessary) and repeat this process.



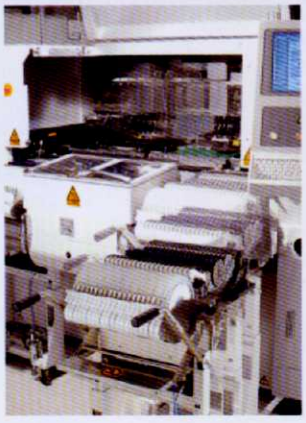
▶Placement efficiency

Reduced nozzle change time



Even nozzle change time has been carefully considered on the FX-1R. A benefit of the HI-Drive is the ability to change nozzles on one head while the other head continues to place components. This means that there is significantly less time lost to nozzle changing compared to a traditional drive system and also does not require a complicated "on-the-fly" nozzle change mechanism.

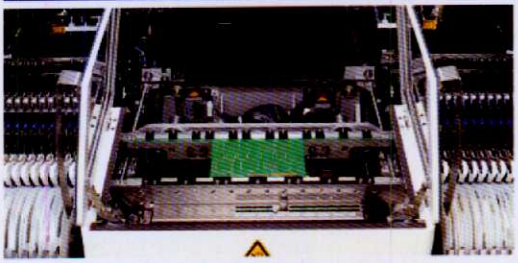
Non-stop Operation (optional)



With the non-stop operation option, feeder banks can be removed and feeders replenished while continuing to run in high speed production. With the HI-Drive system, there is very little impact on the throughput.

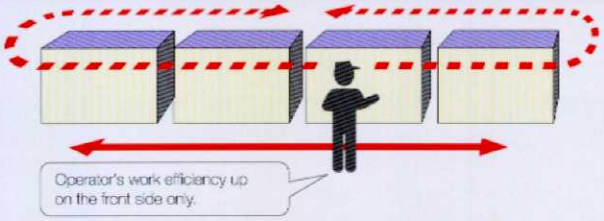
▶Fast setup and changeover

Simple board setup



The HI-Drive allows the PWB table to be moved to an easy-to-access location in the front of the machine. The operator can easily add or remove support pins and change any other hardware for different boards.

Operator efficiency



The flexible design of the FX-1R means that whether you run a high volume or high changeover line, you always get the best efficiency. For a high volume line, feeders can be mounted on the front only. The operator does not need to go to the rear and the machine runs at the maximum tact time. For flexible production, feeders can be mounted on both sides and the machine will still run at the maximum efficiency using the HI-Drive system.

JUKI software supports expandability and productivity at upper level

HLC (Host Line Computer)

HLC is the line control software that makes the modular concept work. On HLC a single production file can be created and edited and then optimized for the entire line in a single step. HLC will divide the production job among each machine in the line, considering each machine's capabilities as it does. The result will be a file optimized and balanced over the entire line. Other important features of HLC include job clustering to minimize changeover time, line monitoring, and job scheduling. HLC connects to the machines via Ethernet and can also be connected to the company network.

▶Expandability

HLC supports from one to seven machines in a single production line, with up to two adhesive dispensers. It is compatible with all KE, KD, FX series, and CX-1 machines as shown in the table. Any combination of machines can be used.

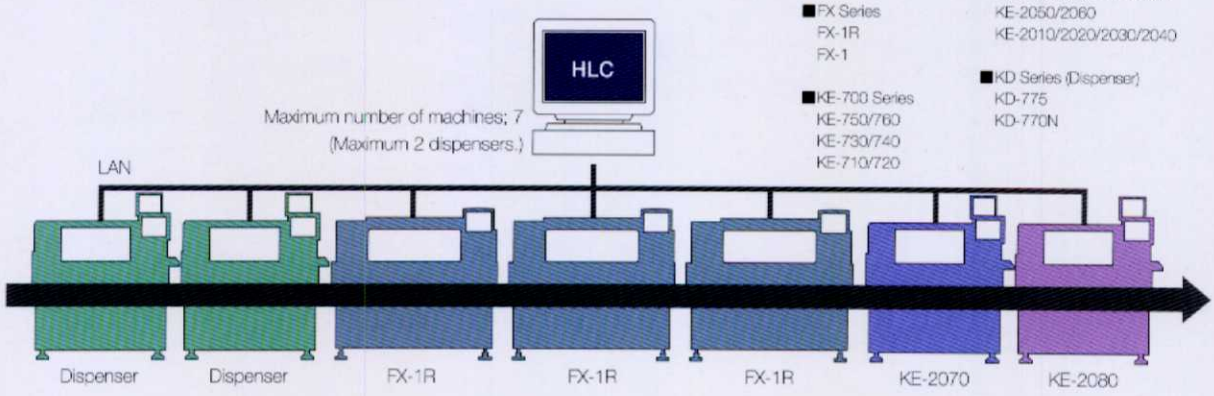
■CX Series
CX-1

■FX Series
FX-1R
FX-1

■KE-700 Series
KE-750/760
KE-730/740
KE-710/720

■KE-2000 Series
KE-2070/2080 NEW
KE-2050R/2055R/2060R
KE-2050/2060
KE-2010/2020/2030/2040

■KD Series (Dispenser)
KD-775
KD-770N

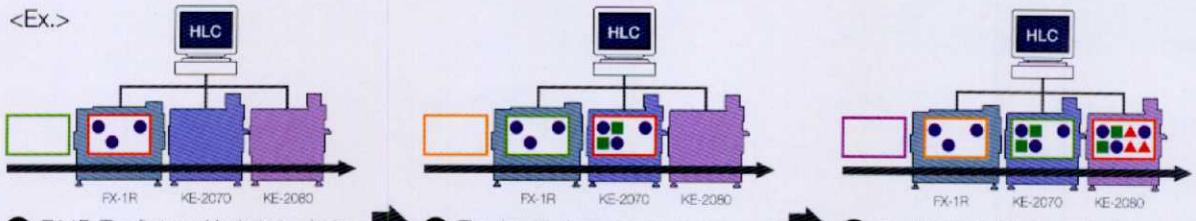


▶Line control

Optimum line balance

With feedback from "Line Balancer" and "Mount Simulation", HLC optimizes the machine program to provide the maximum utilization and efficiency of each placement machine.

<Ex.>



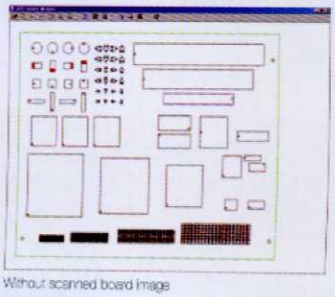
❶ FX-1R (The first machine) starts placing the small chips on the board at high speed.

❷ The board then moves to the next machine (KE-2070) which begins to place additional components. A new board moves into the FX-1R.

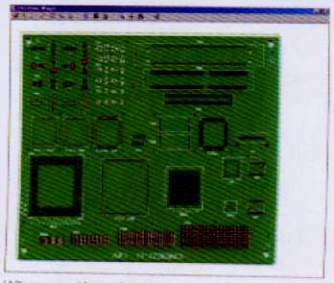
❸ The KE-2080 (third machine) places ICs and large size components on the board and then pass the board to the next process. In this way, HLC allocates the components to be placed by each machine for the best balance and overall throughput.

Board Viewer (option)

The board viewer further reduces changeover time by providing off-line verification of component orientation. The placement program, as created, is overlaid on a scanned image of the PWB. The operator then steps through each placement verifying the rotation. All of this can be done without having to run an actual board, dramatically reducing "first article" inspection time.



Without scanned board image

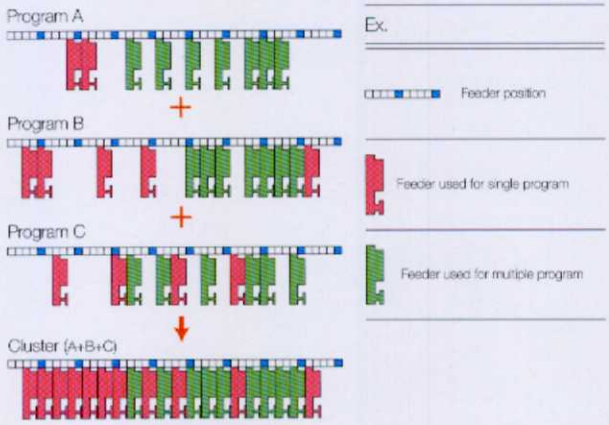


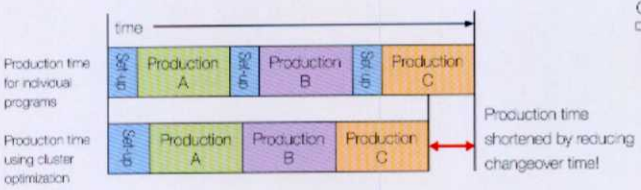
With scanned board image

Powerful support for low volume, high mix production

Cluster optimization

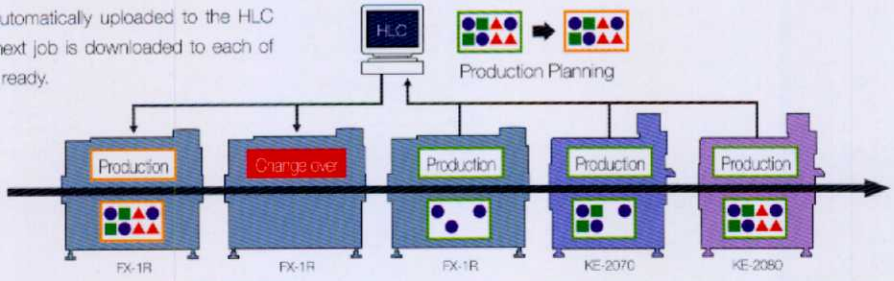
A "Cluster" is a group of feeders that can be used for more than one production file. The feeders required for several different production files are grouped into a single feeder configuration, or cluster, thus eliminating the need for change over between different boards. The clustered feeders, which are used on more than one production file are assigned (set) first, then other feeders, which are used on one particular (single) program are set (assigned).





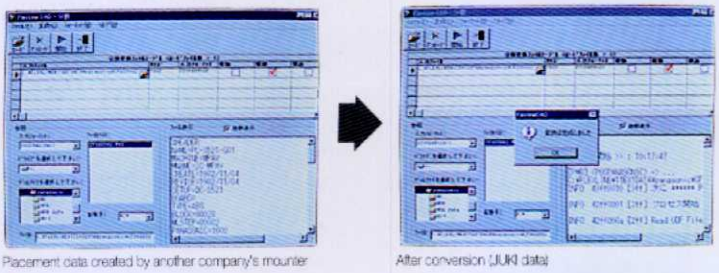
Automatic file download

The operator can set the number of boards to be placed for each job individually. When that number is reached, the current job data is automatically uploaded to the HLC computer and then the next job is downloaded to each of the machines as they are ready.



FLEXLINE CAD

JUKI's flexline CAD is a data conversion application that reads a text file output by various CAD systems or other assembly machines and converts it to the format used by HLC, FX series, KE series machines, or CX-1. There are several supported CAD formats, but users may also define their own format using an interactive "wizard" and save that definition for later use.



Placement data created by another company's mounter

After conversion (JUKI data)

EPU

EPU is off-line programming software designed for a single machine. Using EPU software, the best feeder layout and optimized placement order can be achieved with the highest production efficiency. Like the FX series and the KE-2000 series, it has a component database to further decrease programming time.

High value added system aiming at the quality management which is one step ahead of today

SCS (Setup Control System)

SCS is a feeder barcode verification package that confirms operator accuracy and provides related value-added functions. There are four modules available: Barcode Parts Verification (standard), Off-Machine Setup (optional), Traceability (optional) and Component Balance Management (standard).

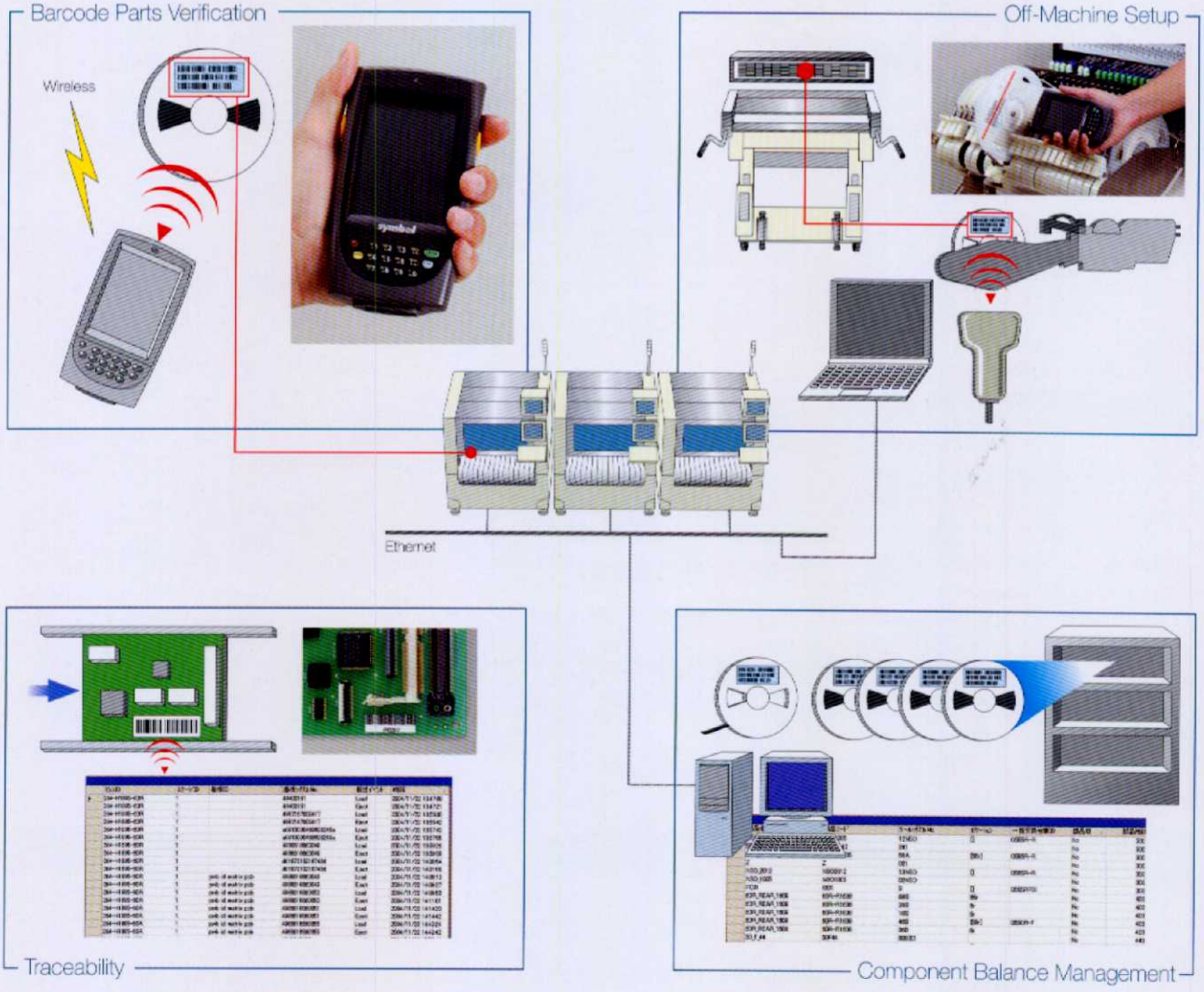
Improved accuracy, productivity and reduced operator workload

Barcode Parts Verification

The main module of SCS is the barcode parts verification. This system confirms that the correct component has been placed in the correct location when a reel or feeder is replaced. An interlock prevents production from continuing until the component and location are successfully verified using a handheld wireless data terminal.

Off-Machine Setup Module (option)

The off-machine setup module allow an operator to verify the placement of all feeders on a feeder trolley before it is installed on a machine. This ensures all feeders are present and accurately placed for a quick changeover.



Identify boards with defective components

Traceability Module (option)

Traceability records the serial number of all boards assembled by each machine along with the part number and lot codes of every component placed. This information can be used to identify potentially "bad" boards resulting from a defective lot of components.

Rationalization to component management

Component Balance Management

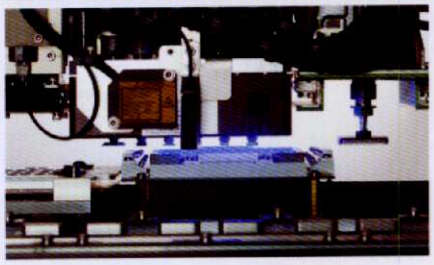
The component balance management is included with SCS to provide basic stock and location information. The stock information is automatically updated as reels are used for production.

※2D barcode reading for traceability.

Available options for a wide variety of needs

▶Increased throughput

MNVC (Multi-Nozzle Vision Centering)



MNVC increases the number of heads capable of placing vision centered parts from one to seven on the KE-2080. This can nearly double the placement rate depending on the component. Highly recommended for boards with a high number of CSPs or other small, fine pitch devices. MNVC is also available on the KE-2070.

▶Eliminate down time

Non-stop Operation

Non-stop operation allows the operator to replace feeders while the machine continues to run at full speed. The TR5D and TR6D matrix tray changers function in NSO mode, allowing uninterrupted production for tray components.

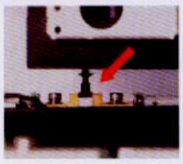
▶Reduce wasted components

Coplanarity Sensor

Measures true coplanarity for both leaded components and BGAs, reducing the chance of a bad solder joint.

Component Verification System (CVS)

Measures electrical resistance, capacitance or polarity to verify components have been loaded correctly on the machine.



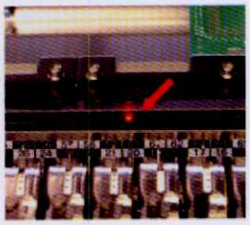
Bad Mark Reader

Detects "bad circuit" marks on matrix type boards and skips placement of parts on all defective circuits, preventing waste.

▶Fast setup and changeover

Feeder Position Indicator

LED's on the feeder bank indicates which feeder needs to be replaced or which feeder has an alarm, indicates location of feeders to be set during change over, and helps simplify feeder setup.



Feeder Trolley

Industry leading design for easy replacement of an entire bank of feeders in seconds. Single switch release / lock and no feeder reteaching required.

KE-2070/2080

FX-1R

Tape Cutter

Automatically cuts used tape and stores it in an easily removable trash bin, eliminating mess and decreasing operator workload.

KE-2070/2080

Rear-side Operation Unit

Allows complete machine operation from the rear side of the machine. (includes monitor, keyboard, and mouse)

Mini Signal Light Tower

In addition to the standard signal tower, shows the operator which side of the machine a component has run out on.

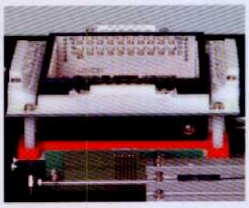
Automatic Board Width Adjustment

Automatic motorized adjustment of the conveyor to the specified board width decreases changeover time.

▶Flexible

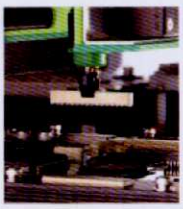
High-resolution Camera

Increases component handling range to include fine pitch CSPs, 0.3mm pitch QFPs and other small devices. 30% higher resolution than the standard camera.



Special-order Nozzles

A wide variety of special order nozzles are available for unusual components, including grippers.



Placement Force Control

Using a built-in load cell, the placement force of each nozzle can be measured and controlled during the placement process. The placement force can be set individually for every component.

▶Ease of operation

Bilingual language support

Software for English / Japanese and English / Chinese is available.

Touch Panel

12" touch sensitive color LCD with tilt function.

▶Cost saving

IC Collection Belt

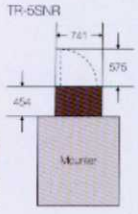
A conveyor belt provides a safe way to handle valuable rejected components. Components gradually index away from the machine and the operator is notified when the belt is full.

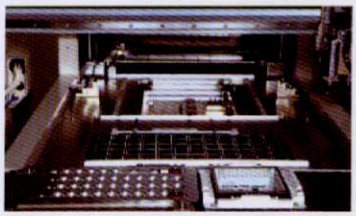
Production efficiency is improved by affluent product variation

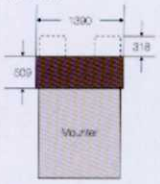
Matrix Tray Changers and Servers

Matrix Tray Server (Rear Type)

TR-5SNR TR-5DNR

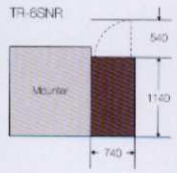


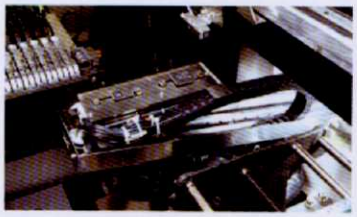


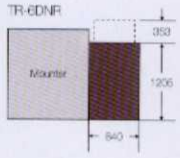


Matrix Tray Changer (Side Type)

TR-6SNR TR-6DNR

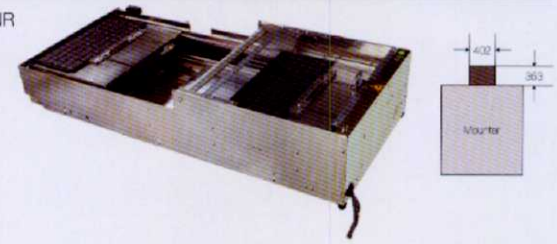






Dual Tray Server (Rear Type)

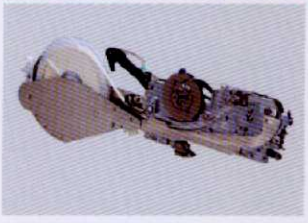
TR-1SNR



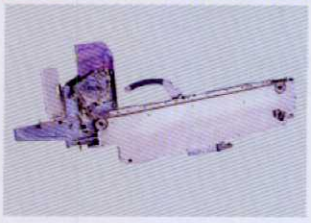
Matrix Tray Holder

Feeders

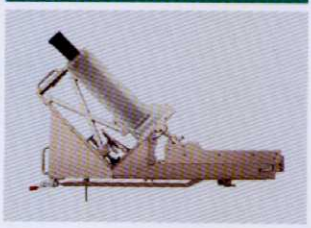
Tape Feeders



Bulk Feeders

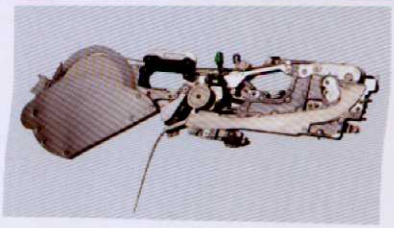


Stack Stick Feeders



Stick Feeders

ATF (Splicing tape feeder)

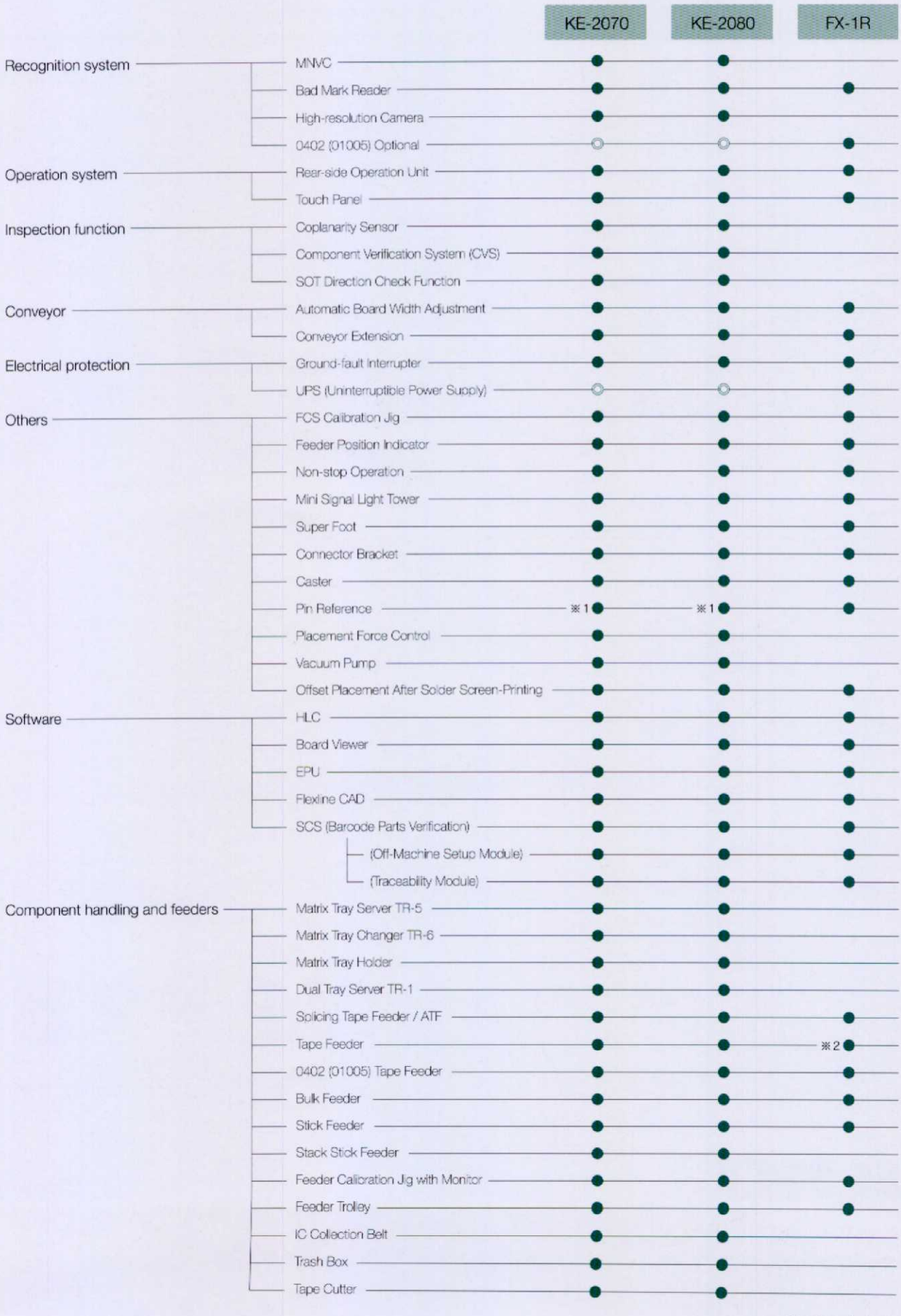


Splicing tape feeder ATF is featuring tape splicing for easy component replenishment during production. Like previous generations, the ATF is fully backwards compatible with all KE and FX series models.


Tape splicing jig (optional)

Feeder Calibration Jig with Monitor

※ for details of feeders, matrix tray changers / servers, please refer to our catalogue of "Feeder series" and "TR-series"



◎··· Standard ●··· Option —··· N / A

※1 E size is not applicable.
※2 Below 44mm feeder

Specifications

Item \ Model		High-speed chip shooter KE-2070M / KE-2070L / KE-2070E	High-speed flexible mounter KE-2080M / KE-2080L / KE-2080E
Board size	M size (330×250mm)	○	○
	L size (410×360mm)	○	○
	E size (510×460mm)※1	○	○
Component height	6mm	○	–
	12mm	○	○
	20mm	–	○
	25mm※2	–	○
Component size	Laser recognition	0402 (01005)~□33.5mm	0402 (01005)~□33.5mm
	Vision recognition	MNVC 1.0×0.5mm※3~□20mm	1.0×0.5mm※3~□74mm or 50×150mm
Placement speed	Chip (IPC9850)	16,000CPH	15,400CPH
	IC※4	MNVC 4,600CPH※5	1,850CPH
			MNVC 4,860CPH※5
Placement accuracy	Laser recognition	±0.05mm (Cpk ≧ 1)	
	Vision recognition	±0.04mm	±0.03mm (±0.04mm when using MNVC)
Feeder inputs		Max. 80 on 8mm T/F※6	
Power supply		200 to 415 VAC, 3-phase	
Apparent power		3kVA	
Operating air pressure		0.5±0.05Mpa	
Air consumption		345L/min (Opt.:Vacuum Pump 50L/min)	403L/min (Opt.:Vacuum Pump 50L/min)
Machine dimensions (W×D×H※7)※8	M size	1,400×1,393×1,455mm	
	L size	1,500×1,500×1,455mm	
	E size	1,730×1,600×1,455mm	
Mass (approximately)		1,530kg	1,540kg

Item \ Model		High-speed modular mounter FX-1R
Board size	L size (410×360mm)	○
Component height	6mm	○
Component size	Laser recognition	0603 (0201)~□20mm or 26.5×11mm (0402 (01005) optional)※9
Placement speed	Chip	33,000CPH (optimum condition)
		25,000CPH (IPC9850)
Placement accuracy	Laser recognition	±0.05mm
Feeder inputs		Max. 80 on 8mm T/F
Power supply		200 to 415 VAC, 3-phase
Apparent power	Averaged value during pickup or placement	4kVA
	Maximum value	12kVA
Operating air pressure		0.5±0.05Mpa
Air consumption		400L/min
Machine dimensions (W×D×H※7)※8		1,880×1,731×1,490mm
Mass (approximately)		2,000kg

※1 Please ask for details on E size board.

※2 Available only for E size board.

※3 KE-2070:When using both high-resolution camera and MNVC. (option)
KE-2080:When using high-resolution camera. (option)

※4 Effective tact: The IC placement speed indicates an estimated value obtained when the machine places 36 QFP (100 pins or more) or BGA components (256 balls or more) on a M size board.
(CPH=number of components placed for one hour)

※5 Estimated value when using MNVC (option) and picking up components simultaneous with all nozzles.

※6 Including matrix tray changer, max 110.

※7 Display is not included in height.

※8 Dimensions of machine described are for conveyor height 900mm.

※9 Please ask for details on 0402(01005) placement.

※Please refer to the product specifications for details.

JAB QS Accreditation R001 JSA QMS ISO9001:2000 REG.NO.JSAQ361

JUKI CORPORATION
Electronic Assembly & Test Systems Div.
Design, development, production management, installation and servicing of the Surface Mount Equipment.

JAB EMS Accreditation RE005 JSA EMS ISO14001:1996 REG.NO.JSAE389 UKAS 089

JUKI CORPORATION HEAD OFFICE
The environmental management system to promote and conduct
①the technological and technical research, the development and design of the products in which the environmental impact is considered,
②the conservation of the energy and resources, and the recycling, in the research, development, design, distribution, sale and maintenance service of the industrial sewing machines, household sewing machines and industrial-use robots, etc. and in the purchase, distribution and sale of the household commodities including the healthcare products.

JUKI®

JUKI CORPORATION
Electronic Assembly & Test Systems Division
8-2-1 Kokuryo-cho Chofu-shi Tokyo 182-8655, JAPAN
TEL.81-3-3480-3371 FAX.81-3-3488-1971

http://www.juki.co.jp

■JUKI Specifications and appearance may be changed without notice.

Dec-2007/1000

R100