Universal Instruments

MC-6099 6/13

FUZION™

Build better. Build more. Spend less.
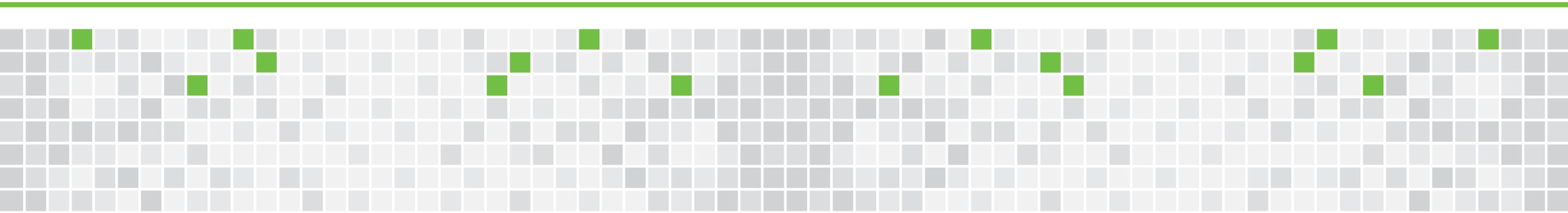
Maximize Competitive Advantage

FUZION
Build Better. Build More. Spend Less.

### A contemporary model for profitability

A Changing Market

The electronics landscape is continuously evolving to meet the demands of a dynamic market. Products that were once exclusive have undergone mass global adoption, driving extreme diversity and complexity, shortened product lifecycles, and the expectation for higher performance at the lowest cost.

New Expectations

Today's requirements present electronics manufacturers in all production environments with a significant challenge to reduce costs and time-to-market in a contracted market window – all while delivering the best in features, flexibility and performance in the products they build.

Whether prototyping or sustaining high-volume production, manufacturers must leverage efficient, adaptable, cost-effective solutions to meet these objectives and ensure profitability in a highly competitive market.
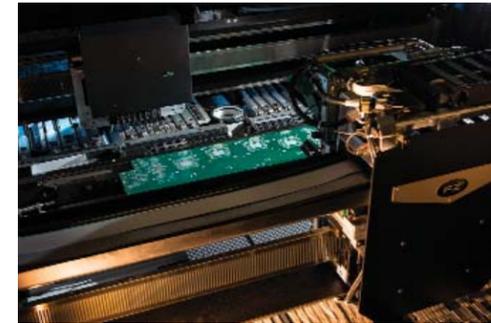
Fuzion™ enables manufacturers to accommodate the most diverse revenue stream and produce a full range of products in a lean environment – build any product at any time, accelerate new product introduction and ramp to volume, maximize utilization, quality, and yield. Fuzion enables operational excellence to deliver considerable cost savings, increased productivity and ultimate profitability.

Maximize utilization and Overall Equipment Effectiveness (OEE)
- High-mix agility
- Sustained high-volume productivity
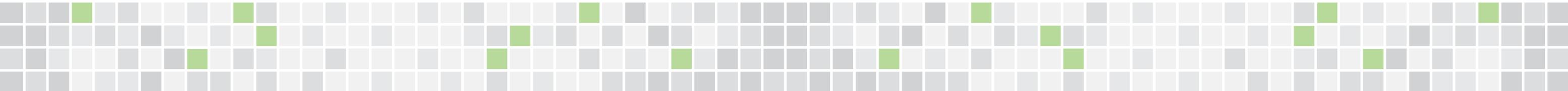
Optimize performance for any product mix
- Build any product at any time
- Solutions for any environment

Accelerate NPI and achieve 100% first-pass yield
- Comprehensive prototyping solutions
- Seamless transition to volume

Enjoy lowest cost of operation and ownership
- Lower CapEx investment
- Reduced operating costs

Peak Efficiency

Ultimate Flexibility

Increase utilization by up to 50% and maximize OEE

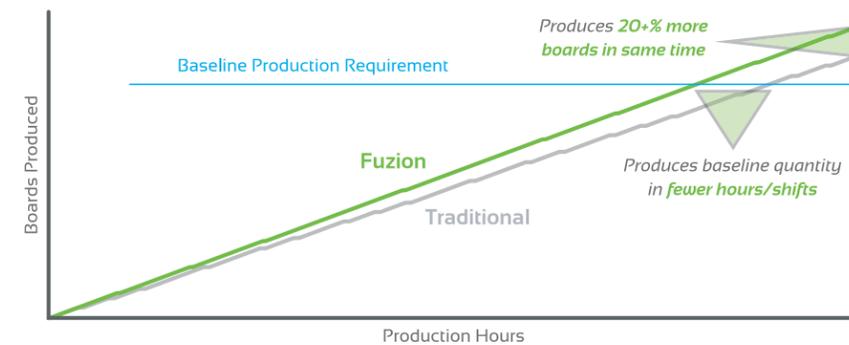*Optimize performance for any product mix*

High-mix agility

• Reduce or eliminate setups with multiple, fixed family or flexible schemes, thereby increasing output or eliminating production shifts

• Streamline changeover with off-line/auto-online setup validation and rapid bank change

• Promote a lean environment with smaller lot sizes, reduced WIP and increased turns
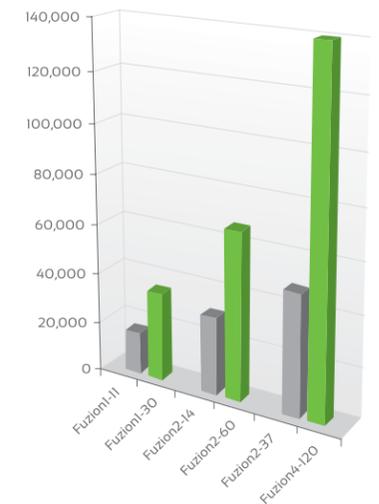
Build any product at any time with unmatched flexibility

• Handle the broadest range of components, package types, board sizes

• Address odd-form requirements with 5kg placement force, automated gripper nozzle change, and advanced feature recognition

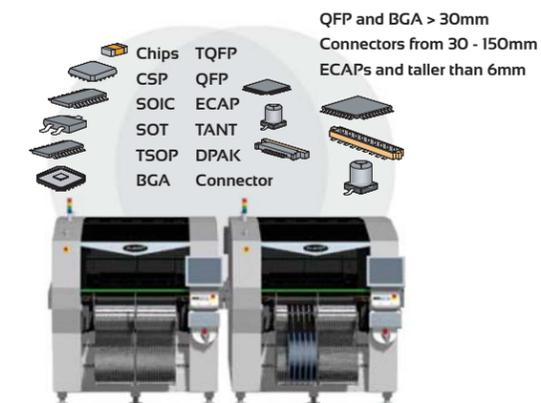• Support advanced process requirements with high-end accuracy and technologies

Sustained high-volume productivity

• Continuous production flow enabled by splicing, duplicate/alternate feeder replenishment, feeder-low warnings, and feeder hot swap

• Minimize replenishment times with easy-loading ion™ feeders

• PCB staging and component pre-pick for < 30 second pulse rates

Solutions for any environment

• Comprehensive portfolio and scalable configurations (from LVHM to high-volume)

• Complete assembly line solutions from high-speed chip to extreme odd-form

• Realize machine/line balance and achieve predictable output regardless of complexity due to the widest overlapping component range between placement heads

• Flexibility to meet new market challenges throughout the product lifecycle

Scalable Throughput

Fuzion efficiency = greater output

Produces 20+% more boards in same time

Baseline Production Requirement

Fuzion

Produces baseline quantity in fewer hours/shifts

Traditional

Boards Produced

Production Hours

• Eliminate setups and reduce setup time for up to 50% utilization improvement

• Eliminate head changes and machine reconfigurations for new products

• 20+% more boards in same time frame or eliminate production shifts and acheive the same output

Change the program, not the line

Chips	TQFP
CSP	QFP
SOIC	ECAP
SOT	TANT
TSOP	DPAK
BGA	Connector

QFP and BGA > 30mm
Connectors from 30 - 150mm
ECAPs and taller than 6mm

Fuzion Line Output Across Random Product Mix
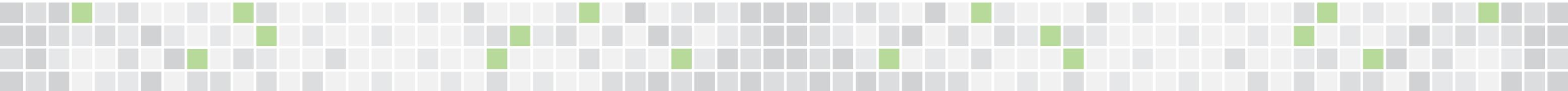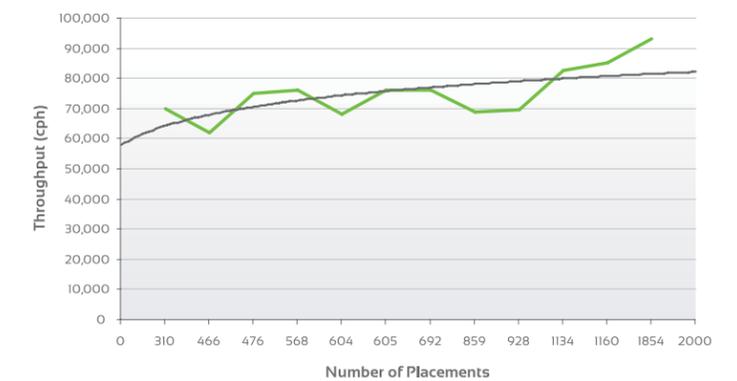
Throughput (cph)

Number of Placements

Accelerate NPI and achieve 100% first-pass yield

Comprehensive prototyping solutions

- Prototype on a single platform

- Eliminate production validation time using off-line board and component teach and verification

- Ensure fast and precise NPI with direct data import, on-the-fly production editing, auto board/feeder/component teach, and post-placement inspection

- Support NPI with tape, tube, strip, or tray feeding capability and a large on-line nozzle inventory

Seamlessly transfer from NPI to production volume

- Common platform supports common program, feeders

- No secondary process validation required

*Seamlessly transfer from NPI to volume production*

FUZION software

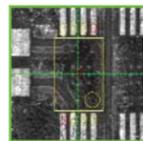**Fastest time to market, highest yields**
- Sequential process for complete board build
- Quickly generate and optimize fiducial, feeder, placement, and component information
- Full editing capability for all aspects of programming in pre-production NPI mode, and dynamic on-the-fly editing in full production mode eliminate need for machine stoppages and reduce scrap and repair costs
- Semi-automated solder paste and post-placement inspection
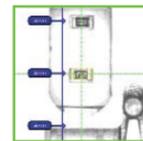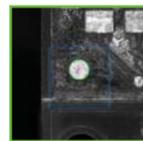
| Feeder Inspection | Fiducial Inspection | Pre-Placement Inspection | Component Teach | Component Inspection | Post-Placement Inspection |
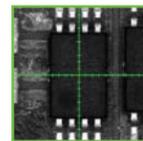
Enjoy lowest cost of operation and ownership

Utilities

Engineering

Maintenance

Labor

CapEx

Fuzion | **Traditional Multi-Module**
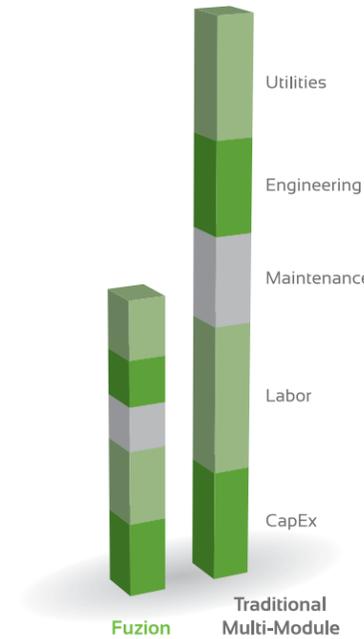
Lower CapEx investment

- Purchase fewer modules versus alternative solutions

- Leverage existing installed base of feeders, nozzles, spares, training, etc.

- Utilize more feeders at the lowest capital cost per input

- Benefit from investment protection with future-proof technologies and the highest residual value

Reduced operating costs

- Decrease production costs with fewer operators, less maintenance/consumables, power/air consumption, programming and labor/repair costs

- Consume less shop floor space with fewer modules and tighter line spacing

- Minimize scrap, waste and rework through closed-loop yield features

- Lowest cost per placement and superior yields for high-volume applications

Lowest cost per input. Most inputs per floor space.

2x FuzionXC Platform line
536 feeder inputs
lowest CapEx

12x mini module line
500 feeder inputs
2.1x CapEx

5x traditional platform line
500 feeder inputs
1.6x CapEx

Solutions for any Market

NPI / All-in-One
Single-machine solution from prototyping to LVHM

FuzionXC2-37   PTF

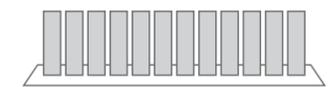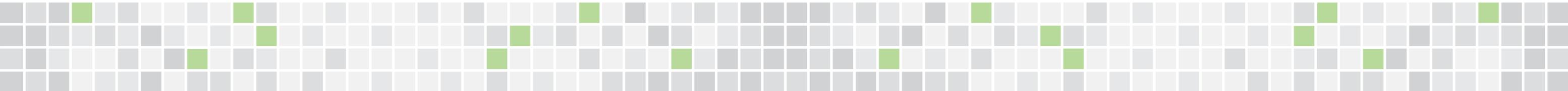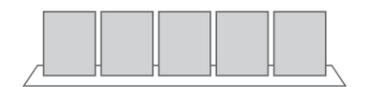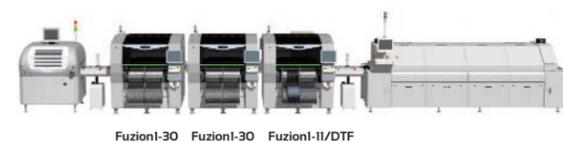| |
|---|
| **Scalable NPI – volume, smaller/low-volume OEM/EMS, higher-complexity markets** |
| **20-25k line cph real throughput** |
| Advanced NPI software, Auto component teach and edit on-the-fly for immediate first article |
| 270+ 8mm inputs, 58 random access tray inputs, strip tape and track feeder support |
| Large PCB size range: up to 610 x 1300mm (24" x 51") |
| Large component range: 01005 - 150mm, micro BGA, + PoP, odd-form |
| Off-line component teach and program validation |
| Direct CAD/Gerber import with BOM merge |
| **Leverage component range and single-machine process capabilities** |

Medium-Volume, Medium-Mix
Highest flexibility (front/back setups)

Fuzion1-30   Fuzion1-30   Fuzion1-11/DTF

Medium-Volume OEM, White Goods, Military, Medical
30k - 45k line cph real throughput
Rapid changeover with full feeder bank exchange, family setups
User-friendly offline setup and validation with self-ID feeders
390+ 8mm inputs, 40 random access tray inputs, track feeder support
Large PCB size range: up to 508 x 635mm (20" x 25")
Large component range: 01005 - 150mm
Extensive component range overlap across all modules for easy balancing
Leverage zero setup time with front/back changeover schemes

Medium-Volume, High-Mix
Quote any job and turn it quickly

FuzionXC2-60   PTF   FuzionXC2-37
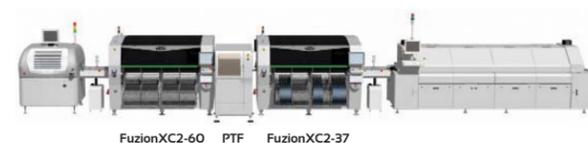
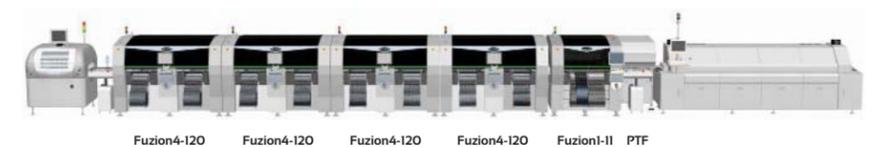| |
|---|
| **Complex assemblies, EMS/ODM manufacturers, Server/Data Storage, Internet Infrastructure, LED Signage and Displays** |
| **40-50k line cph real throughput** |
| Advanced NPI software, edit on-the-fly for immediate first article |
| 540+ 8mm inputs, 58 random access tray inputs, strip tape and track feeder support |
| Largest PCB size range: up to 610 x 1300mm (24" x 51") |
| Large component range: 01005 - 150mm connectors, micro BGA |
| PoP, odd-form capable |
| **Leverage feeder capacity and flexible (Feeder Anywhere) setup capabilities** |

Higher-Volume, Medium-Mix
Efficiency and no compromises for constantly changing environments

Fuzion2-60 Fuzion2-60 Fuzion2-37 Fuzion1-11/DTF

Industrial, Telecom, Computer, TV, SetTop Box, Gaming, Tablet
60k - 80k line cph real throughput
Rapid changeover with full feeder bank exchange, family setups
User-friendly offline setup and validation with self-ID feeders
480+ 8mm inputs, 40 random access tray inputs, track feeder support
Large PCB size range: up to 508 x 635mm (20" x 25")
Increased multifunction and odd-form capacity (25mm tall, 5kg force capable)
Extensive component range overlap across all modules for easy balancing
Leverage zero setup time with front/back or left/right changeover schemes

High-Volume, Lower-Mix
Little derate and the highest utilization for competitive cost advantages

Fuzion4-120   Fuzion4-120   Fuzion1-11   PTF

Consumer, Automotive, Hard Drive, LED Lighting
100k - 150k line cph real throughput
Fully spliceable, hot swap, alternate, or duplicate feeder replenishment
Throughputs not reliant on gang-picking/duplication of feeders
Auto tray replenishment
400+ 8mm inputs (large reel capable), 58 random access tray inputs
01005 - 150mm, micro BGA, package-on-package (PoP), odd form shields, connectors
<25dpmo (real) enabled by FZ30 head technologies, ion feeders, closed-loop monitoring
Line Manager utilization tools for sustained output, LineChart to monitor factory performance

Ultra High-Volume
Complete solution for high-volume mobile phone production

Fuzion4-120   Fuzion4-120   Fuzion4-120   Fuzion4-120   Fuzion1-11   PTF

| |
|---|
| **Mobile Phone** |
| **280k - 320k line cph real throughput** |
| Fully spliceable, hot swap, alternate, or duplicate feeder replenishment |
| Throughputs not reliant on gang-picking/duplication of feeders |
| PCB staging and component pre-pick for < 30 second pulse rates |
| ~700 8mm inputs (large reel capable), 58 random access tray inputs, auto tray replenishment |
| Industry standard for 01005 – package-on-package (PoP), odd form shields, connectors |
| <25dpmo (real) enabled by FZ30 head technologies, ion feeders, closed-loop monitoring |
| Fastest placement head in the industry provides high throughput and low cost per placement |
| **Line Manager utilization tools for sustained output, LineChart to monitor factory performance** |

Base Frame

• Robust and stable foundation for accurate and repeatable performance

• Precision machined to within 1μm from corner to corner for extreme accuracy

VRM Linear Motor Positioning System

• High-accuracy (1μm resolution), closed-loop positioning control supports current, converging and emerging technologies

• High acceleration – up to 2.5G

• Dual-drive control is self correcting and reduces settle times

• Thermally stable, non-magnetic

• Fewer moving parts for minimal maintenance and no adjustments

• 20-year lineage – thousands of proven VRM platforms in the field today

• Direct drive technology stands the test of time to maintain its accuracy indefinitely
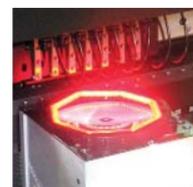
Magellan Digital Upward-Looking Camera

• Exceptional flexibility for NPI through high-volume, high-throughput applications

• High resolution of 1024 x 1024 to facilitate small part feature recognition

• Large 55mm field-of-view improves throughput for applications that typically require multiple FOVs

• Complete feature-based recognition: full-lead/all-bump, missing-ball, orientation check, odd-form features

• Provides substantial throughput improvements for applications that require multiple scans

• Front, side, and on-axis lighting that can be used individually or in combination

• Lighting intensity is consistent across viewable area for faster, more accurate alignment and inspection

FZ™ Placement Heads

• Extensive component ranges that significantly overlap between heads, delivering superior line balancing and the ability to simply change the program, and not the line or heads, when changing products

• Robust design, low maintenance, industry-leading accuracy and performance

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Chip	LED	Tant Cap	SOIC	TSOP	DPAK	QFP	BGA	PLCC	CSP	Electrolytic Cap	Connectors	CCGA	BNGA	Odd-Form	Pin-in-Paste

FZ30™ Placement Head

The FZ30 is the industry's fastest, most accurate and most flexible high-speed placement head.

Maximized Performance

• Industry's fastest tact time (55ms), 35,000 cph per head

• Industry's most accurate high-speed placement head (34μm)

• Little derate, not reliant on gang picking, predictable throughputs on any mix

Uncompromising Flexibility

• Largest component range for a high-speed head (01005–30mm square): lead-less, leaded, bumped, odd-form with little need to skip spindles

• Full-lead/all-bump inspection, missing-ball inspection/orientation check

Highest Quality and Yields

• Vertical Part Sensor (VPS) validates part presence, orientation, and thickness; inspects nozzles and enables on-the-fly exchange of suspect nozzles

• Auto Pocket Teach and touchdown sense at both pick and place improves pick ppm, guarantees ideal placement force, and reduces nozzle wear

• Single pick point eliminates gang picking (multiple pick point) concerns

• Auto nozzle centering/contamination check/bypass assure sustained yields
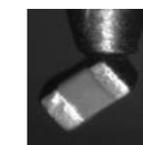
FZ7™ Placement Head

The FZ7 head quickly and accurately places components as small as 0201 up to 55mm square with single field-of-view inspection and up to 25mm tall.

• Precision accuracy (27μm @ Cpk>1)

• Advanced odd-form capability and insertion forces up to 5kg

• Components up to 150mm with multiple fields of view

• Standard Package-on-Package functionality

FZ30 - *Unmatched flexibility and performance*

Flexibility

■ Fuzion
■ Competitor A
■ Competitor B
■ Competitor C

Speed   Accuracy
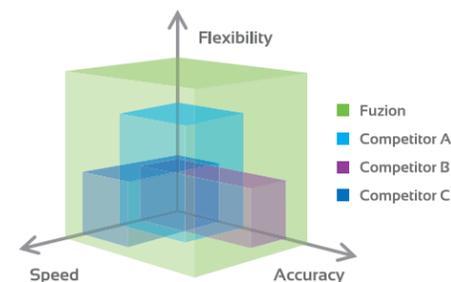
FZ30 - *Best-in-class accuracy of 34μm*
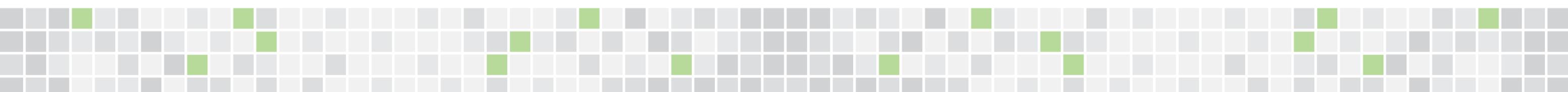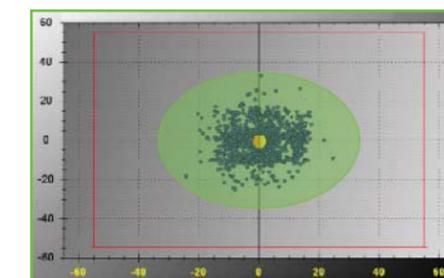
Fuzion Portfolio

Single-Beam Models

Fuzion1-11

Versatile IC placement platform perfect for special processes such as Pin-in-Paste, Flip Chip and OFA

Single-beam, dual-drive overhead gantry system

One 7-spindle FZ7 and one 4-spindle FZ4 placement head

Upward-looking vision system

Fuzion1-30

Superb for high-mix NPI environments and large board applications. Also a high-volume line booster.

Single-beam, dual-drive overhead gantry system

One 30-spindle rotary FZ30 placement head

Dual on-the-head optics

Dual-Beam Models

Fuzion2-14

Best-in-class multi-function machine with fast placement of a wide component range for applications where flexibility and performance per line length are important

Dual-beam, dual-drive overhead gantry system

Two 7-spindle FZ7 placement heads

Upward-looking vision system

Fuzion2-37

A true multi-purpose platform. A versatile stand-alone prototyping solution, a flexible line balancer, or a high-performance multi-function solution.

Dual-beam, dual-drive overhead gantry system

One 30-spindle rotary FZ30 and one 7-spindle FZ7 placement head

Dual on-the-head optics and upward-looking vision system

Fuzion2-60

Flexible, high-speed productivity for medium-volume environments. A powerful line booster solution or high-performance small part placer.

Dual-beam, dual-drive overhead gantry system

Two 30-spindle rotary FZ30 placement heads

Dual on-the-head optics

Dual-Beam High-Capacity Models

FuzionXC2-37

High-capacity NPI, all-in-one, line balancer, or multifunction solution with a full component range

Dual-beam, dual-drive overhead gantry system

One 30-spindle rotary FZ30 and one 7-spindle FZ7 placement head

Dual on-the-head optics and upward-looking vision system

FuzionXC2-60

Cost-efficient, high-performace turret replacement or high-input chip placer

Dual-beam, dual-drive overhead gantry system

Two 30-spindle rotary FZ30 placement heads

Dual on-the-head optics

Quad-Beam Models

Fuzion4-120

Powerful performance for high-volume production environments: Consumer, Mobile, Notebook, Auto

Quad-beam, dual-drive overhead gantry system

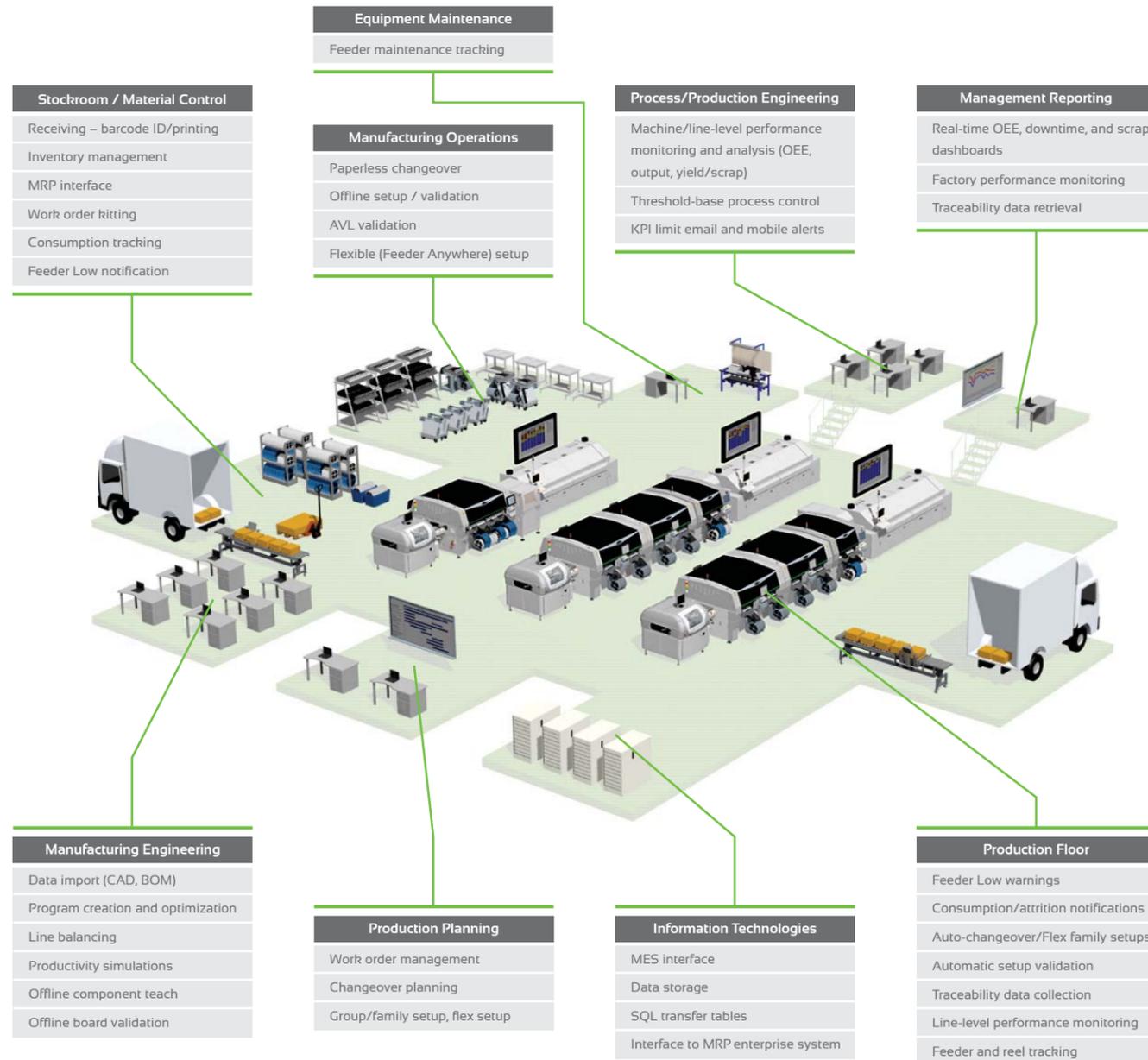Four 30-spindle rotary FZ30 placement heads

Dual on-the-head optics

Model	Throughput (cph)	Accuracy (µm@≥1.00 Cpk)	Max Board Size	Max Feeder Inputs (8mm)	Component Range (mm)
Fuzion1-11	16,500 (Max) / 11,400 (1-Bd IPC Chips)	±38 (Chips) / ±27 (ICs)	508 x 813mm / 20 x 32"	120 (2 ULC)	(0201) .25 x .5 x .15 (Min) / 150 square and up to 25 tall
Fuzion1-30	35,000 (Max) / 22,600 (1-Bd IPC Chips)	±34 (Chips) / ±34 (ICs)	508 x 1016mm / 20 x 40"	136	(01005) .18 x .38 x .10 (Min) / 30 x 30 x 6 (Max)
Fuzion2-14	30,750 (Max) / 21,750 (1-Bd IPC Chips)	±38 (Chips) / ±27 (ICs)	508 x 813mm / 20 x 32"	120 (2 ULC)	(0201) .25 x .5 x .15 (Min) / 150 square and up to 25 tall
Fuzion2-37	48,000 (Max) / 27,500 (1-Bd IPC Chips)	±34 (Chips) / ±27 (ICs)	508 x 1016mm / 20 x 40"	128 (1 ULC)	(01005) .18 x .38 x .10 (Min) / 150 square and up to 25 tall
Fuzion2-60	66,500 (Max) / 40,500 (1-Bd IPC Chips)	±34 (Chips) / ±34 (ICs)	508 x 1016mm / 20 x 40"	136	(01005) .18 x .38 x .10 (Min) / 30 x 30 x 6 (Max)
FuzionXC2-37	43,000 (Max) / 20,500 (1-Bd IPC Chips)	±34 (Chips) / ±27 (ICs)	610 x 1300mm / 24 x 51.2"	272	(01005) .18 x .38 x .10 (Min) / 150 square and up to 25 tall
FuzionXC2-60	65,500 (Max) / 30,000 (1-Bd IPC Chips)	±34 (Chips) / ±34 (ICs)	610 x 1300mm / 24 x 51.2"	264	(01005) .18 x .38 x .10 (Min) / 30 x 30 x 6 (Max)
Fuzion4-120	140,000 (Max) / 81,000 (1-Bd IPC Chips)	±34 (Chips) / ±34 (ICs)	500 x 700mm / 19.7 x 27.6"	144	(01005) .18 x .38 x .10 (Min) / 30 x 30 x 6 (Max)

Manufacturing Execution Software

Dimensions®

Connect. Streamline. Control.

The Dimensions software suite features powerful NPI solutions and changeover tools to accelerate product introductions, as well as turnkey shop floor control tools that provide real-time visibility and analysis to maximize utilization and track and trace materials during production.

Equipment Maintenance
Feeder maintenance tracking

Stockroom / Material Control
Receiving – barcode ID/printing
Inventory management
MRP interface
Work order kitting
Consumption tracking
Feeder Low notification

Manufacturing Operations
Paperless changeover
Offline setup / validation
AVL validation
Flexible (Feeder Anywhere) setup

Process/Production Engineering
Machine/line-level performance monitoring and analysis (OEE, output, yield/scrap)
Threshold-base process control
KPI limit email and mobile alerts

Management Reporting
Real-time OEE, downtime, and scrap dashboards
Factory performance monitoring
Traceability data retrieval

Manufacturing Engineering
Data import (CAD, BOM)
Program creation and optimization
Line balancing
Productivity simulations
Offline component teach
Offline board validation

Production Planning
Work order management
Changeover planning
Group/family setup, flex setup

Information Technologies
MES interface
Data storage
SQL transfer tables
Interface to MRP enterprise system

Production Floor
Feeder Low warnings
Consumption/attrition notifications
Auto-changeover/Flex family setups
Automatic setup validation
Traceability data collection
Line-level performance monitoring
Feeder and reel tracking

Versatile Feeding Solutions

Fuzion Platforms support the widest variety of input types in the industry; from strip tape NPI and tube feeders to high-volume continuous-splice tape feeders, random access matrix tray feeding, and odd-form feeders to support any automated assembly challenge.

High-Performance Tape Feeders

ion™

ion Feeders
- Fast/easy loading
- Load-in-place on feeder bank reduces handling time
- Operator-friendly ergonomics (size, weight, latching)
- Flexible reel management (baskets or optional reel holders)
- Strip tape-friendly
- 8mm dual-lane and 12/16mm single-lane occupy single slot
- Standard high-performance 01005 capability
- Multi-pitch (SL/DL), independent pitch and index speed (DL)
- Latch sensor enables safe hot swapping
- High-utilization continuous-splice capability with splice detection

Gold Plus Feeders
- 8 - 88mm tape widths, multi-pitch
- Integrated reel holders
- Dual-lane and single-lane options
- Continuous-splice capability
- Reel detection sensor

NPI Strip Tape Feeders
- Single lane/single slot strip tape feeders
- Multi-lane, multi-slot, matrix tray-style

Random Access Tray Feeders

Direct Tray Feeder (DTF)
- Components picked directly from tray (supports odd-form)
- JEDEC or non-standard vacuum formed matrix trays
- Operates in 3 modes: Exchange (no downtime for replenishment), Concurrent (combined for maxmium capacity), and Job Changeover (zero setup time)

Platform Tray Feeder (PTF)
- No base machine feeder capacity consumed
- Up to 58 different part numbers
- Parts are pre-oriented allowing for gang pick
- Stackable functionality accommodates higher-volume parts
- Automatic empty tray removal

Stationary Matrix Tray Feeder
- Single tray, single part number tray feeder
- Adjustable tray height

SMA Stackable Matrix Tray Feeder
- Stackable alternative for higher volumes of one part number

Specialty Feeders

Tube Feeders
- Adjustable track, multi-input track, single-input multi-tube

Odd-Form / Automation Feeders
- Bowl, GPAX and other feeding solutions