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MC-5700 07/09



 **Dimensions**[®]

SOFTWARE SUITE

connect, streamline, control

increase **productivity** with the **Dimensions Software Suite**

Universal Instruments' Dimensions Software Suite helps you get more from your assembly equipment investment by providing all of the tools you need to improve the utilization and operational efficiency of your Universal Instruments production lines. Dimensions features powerful NPI solutions to accelerate entry of your products into production, and turnkey line management tools that connect your Universal platforms into your overall manufacturing operation.

Use Dimensions NPI software tools to easily import and verify design data, balance your lines, generate optimized programs, and create grouped feeder setups for minimized changeover time. Dimensions line management software helps you gain visibility into your lines, maximize utilization, and track materials during production.

The Dimensions software architecture is designed for maximum flexibility and minimal interdependence, allowing you to choose those modules that best suit your manufacturing requirements.



Dimensions NPI modules

- **Data Prep Studio:** provides advanced data import functionality
- **Dimensions Programming & Optimization (DPO):** helps create balanced, optimized machine programs
- **Machine-side NPI Software:** helps get new products into production quickly and efficiently, and accounts for complex changes during production

Data Prep Studio

- CAD Import
- Gerber Import
- Board Verification
- BOM Merge

Programming & Optimization

- Part Data Management
- Line Balancing
- Optimization
- Grouping

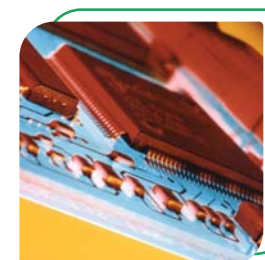
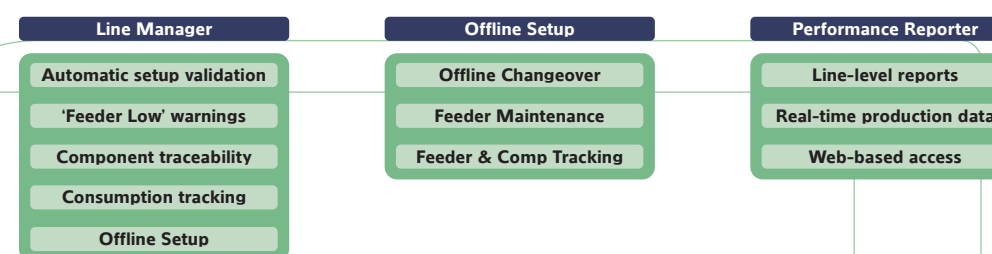
Machine-side NPI

- Feeder Inspection
- Transfer Board
- Fiducial Inspection
- Pre-Placement Inspection
- Circuit/Offset Inspection
- Populate Board
- Post-Placement Inspection



Dimensions Line Management modules

- **Line Manager:** pro-actively manages changeover and part replenishment, monitors part consumption, provides real-time data and component traceability
- **Offline Setup:** provides the ability to begin changeover while production continues
- **Performance Reporter:** provides real-time data for line performance metrics via web browser



Maximize efficiency, minimize costs

Dimensions software streamlines equipment programming and library management, providing a common tool that eliminates duplicate efforts. It also reduces costly rework by assuring the proper components are loaded and replenished, and tracking them to the correct location on each circuit.

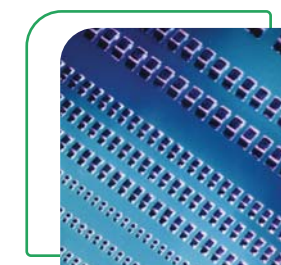


Accelerate changeover in high-mix environments

Changing products has never been so easy. Reduce changeover times and complications with Dimensions software tools. Import data, define parts, balance lines, and debug your process before and during production to realize superior quality. Common feeder setups for multiple products facilitate fast and easy product transitions.

Sustain high utilization in high-volume environments

Keep your lines running to their maximum potential, delivering the highest achievable throughput. Dimensions programming tools creates optimized products that are balanced across your production lines with the optimal part distribution and placement sequence. Feeder Low alerts and Automatic Setup Validation ensure that feeders are correctly located and ready when needed. Grouped feeder setups minimize feeder changes to further guarantee you capitalize on your bottom line.



Trace data for mission-critical production

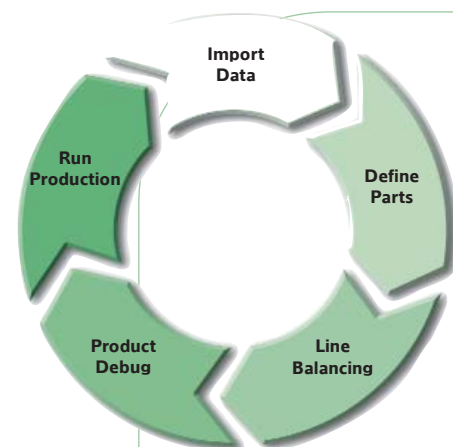
Don't leave anything to chance. Dimensions provides traceability at the board and component level to quickly identify defective boards before they ship, minimizing time requirements and costs. Get piece of mind knowing your product quality reflects positively on your business and that, in the event of a product recall, you have the power to identify defective boards without wasting time and money.

“The Dimensions software suite improves control and productivity in any manufacturing environment.”

powerful **NPI solutions** to **accelerate** production

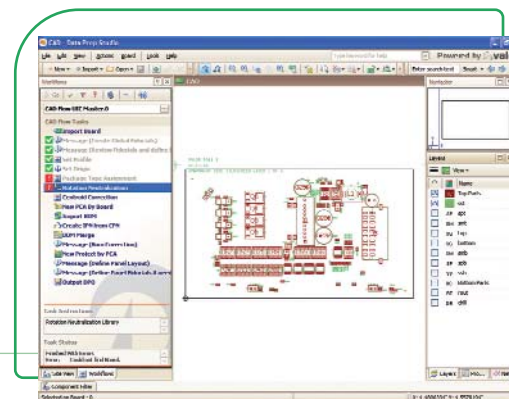
Fast, efficient introduction of new products into full production determines success with small batch sizes – more so than outright speed. Use the Dimensions suite of NPI software tools to easily import and verify design data, balance your lines, generate optimized programs, and create grouped feeder setups for minimized changeover time. You can also leverage machine-side NPI tools at the line to debug your process step-by-step as you build your first article, and also during full production to fine tune established programs to continuously improve quality and efficiency.

- Import any kind of design data
- Generate balanced and optimized products
- Manage factory-wide libraries
- Create grouped setups to minimize changeover
- Efficiently debug process problems on-line
- Achieve a production-ready first pass yield on the first board – no tape required!



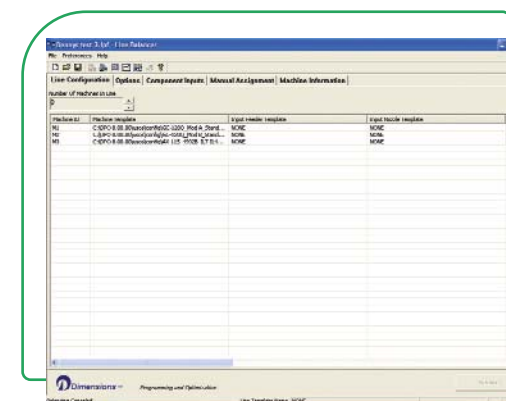
Data Prep Studio

Advanced process data preparation



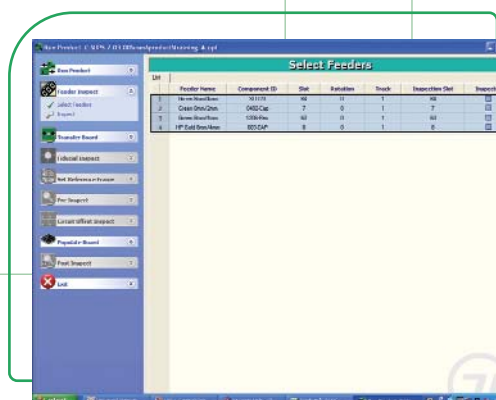
Dimensions Programming & Optimization

Program, balance, and optimize



Machine-side NPI

Get products into production quickly and achieve a production-ready first pass yield



Design Center/
Customer

- BOM
- Gerber
- CAD

Dimensions

Data Prep Studio

- CAD Import
- Gerber Import
- BOM Merge
- Board Viewer

Dimensions

Programming & Optimization

- Part Data Management
- Line Balancing
- Optimization
- Family Group Setups

Dimensions

Machine-side NPI

- Feeder Inspection
- Transfer Board
- Fiducial Inspection
- Pre-Placement Inspection
- Circuit/Offset Inspection
- Populate Board
- Post-Placement Inspection

Run Full Production



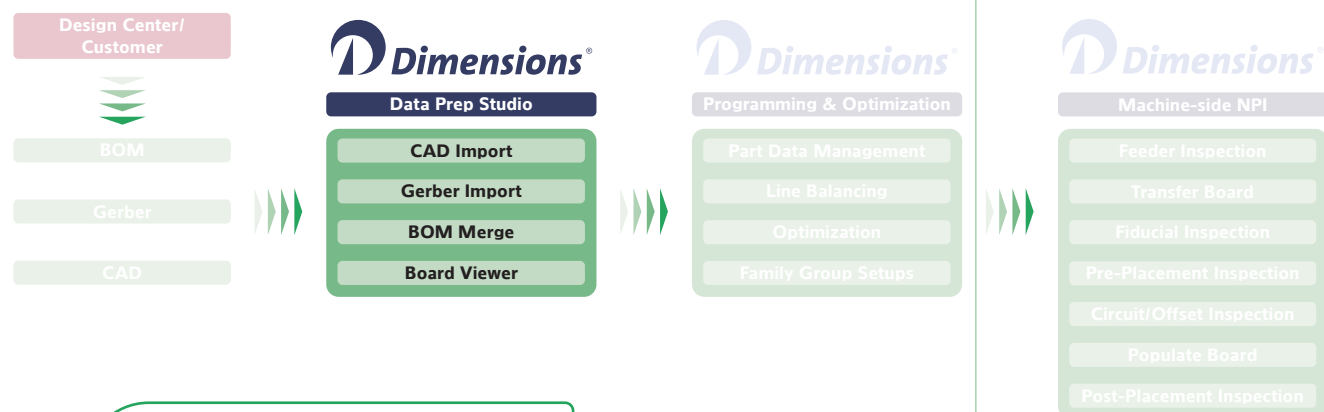
Data Prep Studio

powered by Valor

Universal Instruments' Data Prep Studio expands the capabilities of Universal's NPI software solution by leveraging Valor Computerized Systems' world-renowned process preparation technology to provide advanced data import functionality.

Data Prep Studio takes NPI to the next level by integrating with Universal's Dimensions Programming and Optimization (DPO) software module to deliver comprehensive CAD/CAM translation, BOM import and merge, and robust graphical board verification of import results. It also provides advanced Gerber support, including the ability to automatically extract component information from pads. Additional productivity-enhancing features include normalization of CAD packages to a standard zero-rotation layout (Rotation Neutralization), and automatic calculation of the optimal placement coordinates for each package based on its geometry (Centroid Correction).

Users will appreciate Data Prep Studio for its fast, efficient performance and easy-to-follow workflows that provide step-by-step guidance through the import process. Data Prep Studio greatly streamlines the NPI process, taking advantage of the inherent flexibility of the Universal platform portfolio. When combined with Dimensions DPO software, it delivers a robust offline programming solution that enables a complete, well-defined production process before a single component is placed.



Run Full Production



CAD import

Directly import most standard CAD formats:

- ODB++
- GenCad
- CPL
- Altium P-CAD CAD
- Altium Protel CAD
- Cadence Allegro CAD
- Cadence Orcad-Layout CAD
- Mentor Board Station CAD
- Mentor PowerPCB CAD
- PADS-Perform CAD
- PDIF CAD
- Zuken "evaluated" Cadif CAD
- Zuken "non-evaluated" Cadif CAD
- Zuken PWS CAD
- Zuken BD CAD
- DXF CAM
- EDA Interface, IDF 2.0 & 3.0 M-CAD format CAM
- Excellon 1&2 CAM
- FATF CAM
- Gerber 274D CAM
- Gerber 274X CAM
- HP-GL I&II CAM
- IPC-D-356 Netlist CAM
- Mentor Neutral

Gerber import

Import Gerber and automatically extract component information from pads

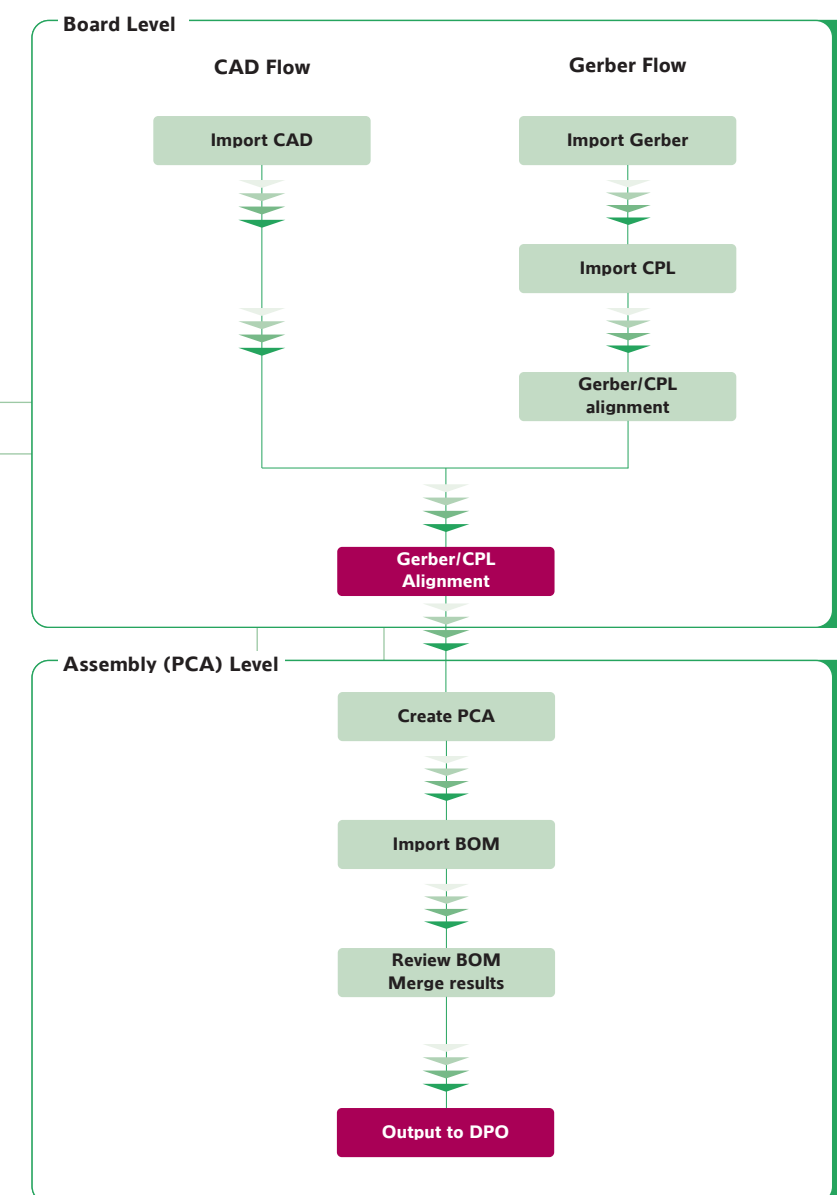
BOM merge

Import and edit BOMs in any format and merge with CAD data

Board viewer

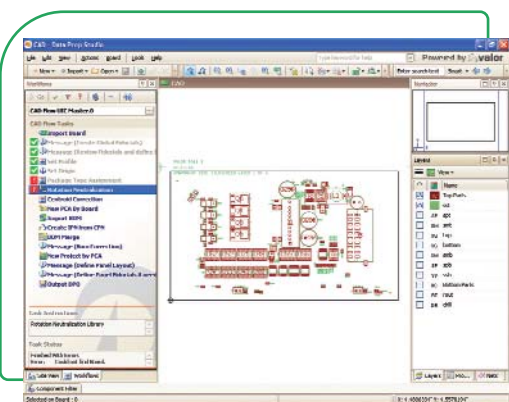
Verify data accuracy prior to program generation

Data Prep Studio process flow



Additional features include:

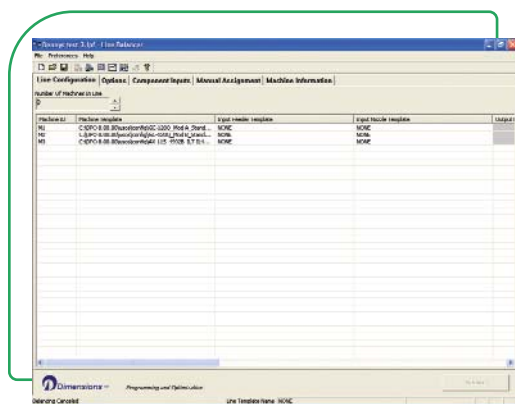
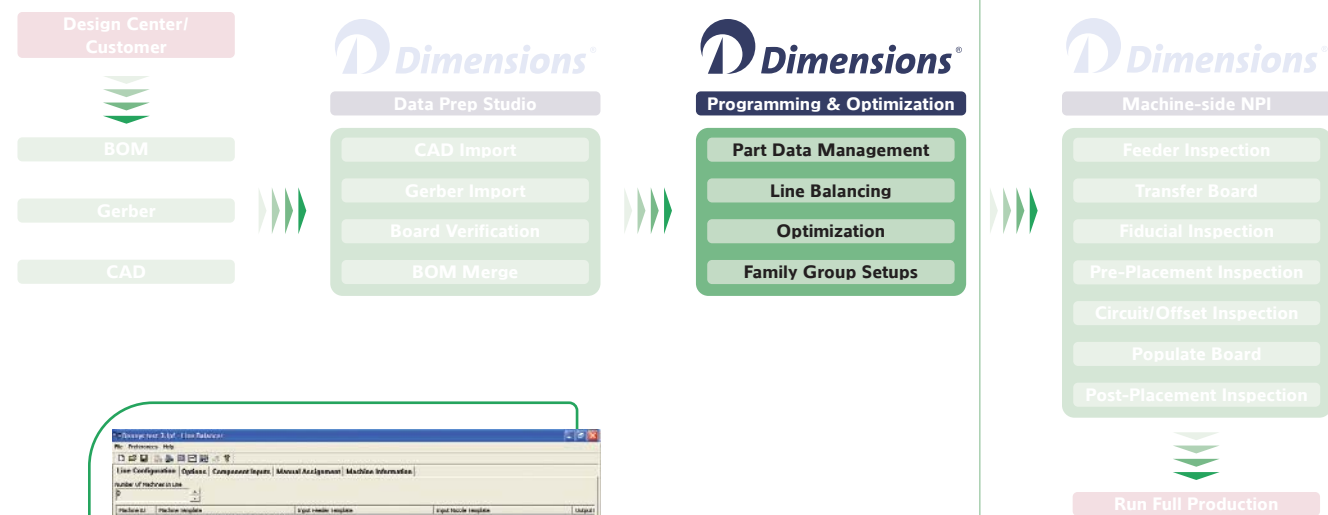
- **Rotation neutralization:** normalize the CAD package to a standard zero-rotation layout
- **Centroid correction:** automatically calculate optimal placement coordinates for each package based on geometry
- **Wizard-style interface:** workflows guide the user through the process
- **DPO integration:** transfer data directly into DPO for program creation



Dimensions Programming & Optimization (DPO)

Dimensions Programming and Optimization (DPO) helps you create balanced, optimized products to ensure you get the highest possible throughput from your Universal lines. DPO features a powerful Line Balancer that distributes parts evenly across machines in the line to eliminate production bottlenecks. Once the line is balanced, the DPO Program Optimizer establishes the most efficient placement sequence for each machine in the line for maximum productivity. Use feeder template generation to define grouped setups for your product families, minimizing feeder changes between products and changeover time.

DPO delivers comprehensive part data management capabilities, including an extensive portfolio of pre-loaded standard packages to streamline the part data definition process. For maximum efficiency, you can also share your component database and products across the network so that they can be used for both programming and production. When combined with Dimensions Data Prep Studio, DPO delivers a robust offline programming solution that enables you to develop a complete, well-defined production process before a single component is placed.



DPO process flow



Part data management

Minimize time requirements; streamline part data creation and centralize programming and production data

- **Master Component Library:** pre-loaded with component definitions of most industry standard surface mount packages such as SOIC14, QFP100, 805RES to save re-work
- **Network-able:** share the same component database across all programming stations and machines to avoid duplication of data

Balancing and optimization

Eliminate bottlenecks; achieve superior balance and utilization to maximize throughput

- **Balance for high-volume:** group parts into categories by part size, and strategically duplicate high-running parts to take maximum advantage of the power of the Lightning head
- **Balance for high-mix:** minimize part duplication for minimal changeover time
- **Optimize:** automatically determine the best pick and place sequence on each machine to minimize head travel and maximize throughput

Family group setups

Group products into families to minimize changeover time; little or no work required when changing over within families

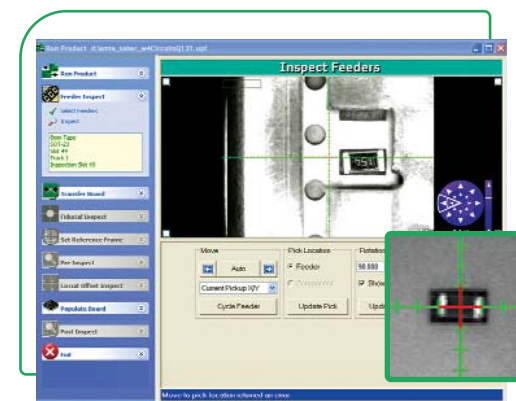
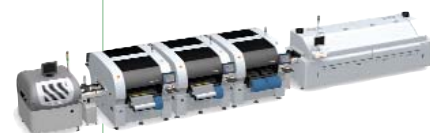
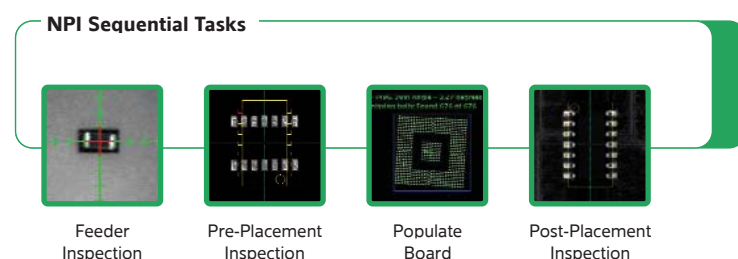
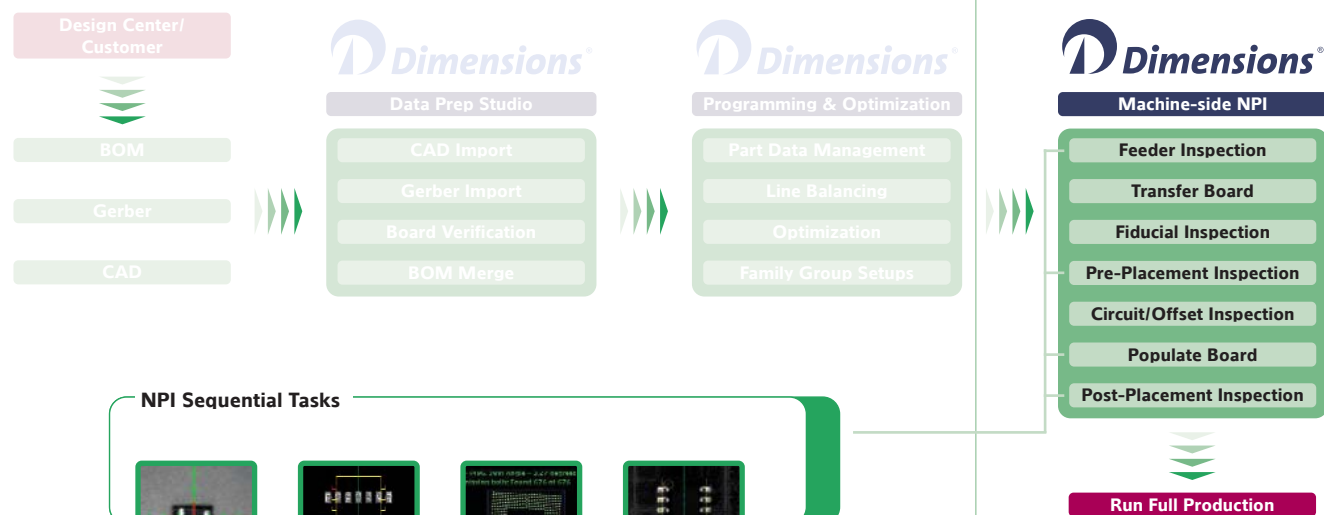
- **Priority method:** rank order the priority of the products in the family, and ensure the most important products (e.g., the highest runners) are the best balanced and optimized
- **High-mix method:** treat all products equally, ensuring the best fit and most complete feeder setup across all products in the family



Machine-side NPI Software

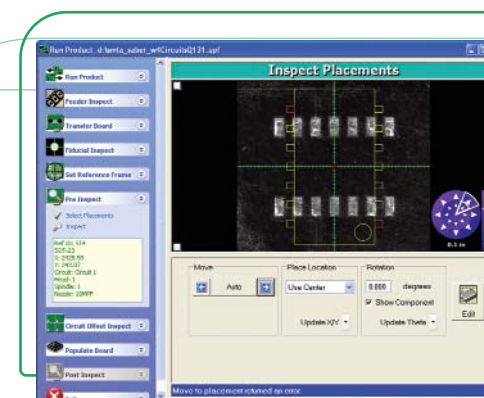
Universal Instruments' machine-side NPI software goes beyond simply introducing a new product into production. It assists throughout production, accounting for complex process changes involving components, boards, placements, and fiducials to ensure you get it right the first time.

- No tape boards required – no waste
- Simple, menu-driven process for new users
- Get products into production quickly, efficiently, and effectively
- Achieve a production ready first pass yield
- Accommodate ECRs (components, boards, etc.)
- Debug placement problems
- Reduce scrap and repair costs
- Fine tune component definitions quickly and easily



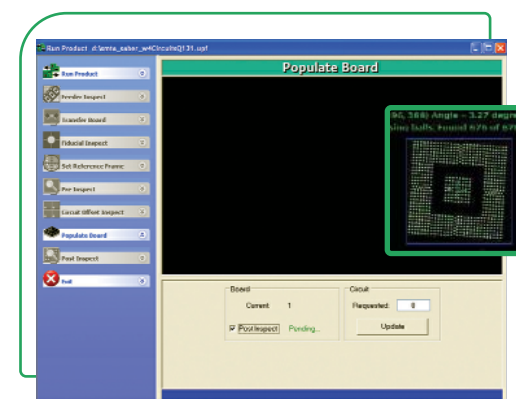
Feeder inspection

- The user may select all or a subset of feeders to inspect
- The user walks through selected feeders, verifying pick point, rotation, and pitch setting. Any inaccurate data is updated as necessary, and stored within product
- The user can select Auto-mode, which sequentially drives to each feeder selected without user intervention. A pause button is available to pause the process.
- Graphic overlays of the component can be used if selected inclusive of orientation mark
- Modifiable move increments ensure tight accuracy
- The user may index feeder from screen, to ensure components are available for initial pick



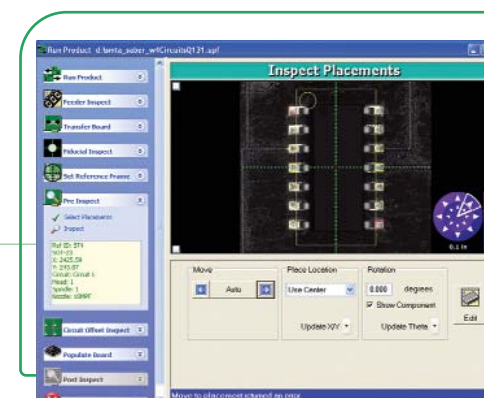
Pre-placement inspection

- Select all or a subset of placements to inspect. A hot button can be used to select one of each component ID.
- Select Auto-mode which automatically steps through placements, or steps through placements individually
- Modify location or rotation
- Display a graphic of component with orientation mark
- A Drive-to-corner function is available if the component is larger than field of view



Populate board

- Feeder, fiducial, and placement errors should be corrected at this point in FAB
- Corrections may still be necessary to component description (light level, geometry, etc.)
- Upon vision failure in NPI full cycle mode, an error recovery screen appears, allowing the user to reject component, skip component, or edit
- If editing, the component's description is displayed with the failed vision image
- Reject, re-inspect, skip, or place component with failed image



Post-placement inspection

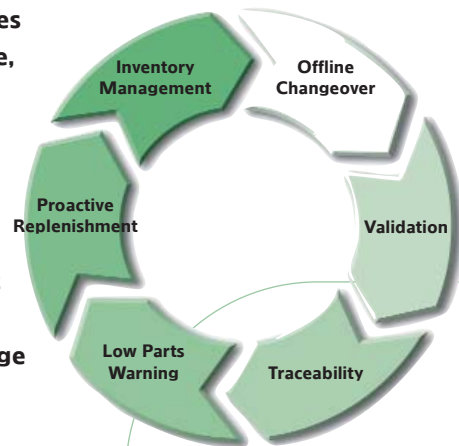
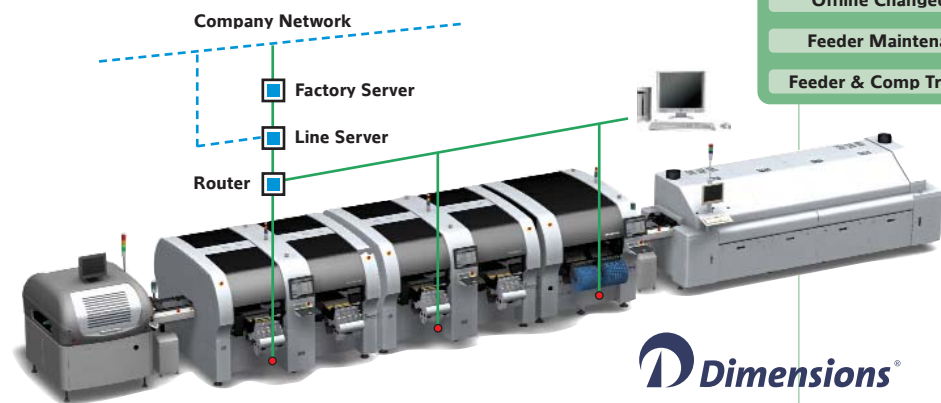
- Select all or a subset of placements for post-placement inspection
- Step through placements selected individually or automatically
- Verify placement rotations and locations
- Semi-automatic optical inspection

line management software to maximize utilization and visibility

Dimensions line management software reduces downtime and improves product quality by delivering a level of shop floor control, performance, efficiency, and integration that is unparalleled in its value. The architecture features modules which may be utilized independently.

Offline setup tools enable product preparation and feeder replenishment while the current product is running. During production, Line Manager maximizes line utilization by managing part replenishment. Further, it provides valuable traceability at the board and component level, while Performance Reporter monitors part usage and provides real-time data to other factory systems.

- Intuitive touch-screen interface with wizard-style functionality
- Closed-loop setup
- Component-level traceability
- Real-time consumption tracking, production data and reports



Dimensions[®] Line Manager

- Automatic setup validation
- 'Feeder Low' warnings
- Component traceability
- Consumption tracking
- Offline Setup

Offline Setup

- Offline Changeover
- Feeder Maintenance
- Feeder & Comp Tracking

Dimensions[®] Performance Reporter

- Line-level reports
- Real-time production data
- Web-based access

Line Manager

Line Manager maximizes line utilization and improves overall efficiency by providing visibility into production. Closed-loop part verification ensures all PCB placements are correct to improve product yields. In addition, dynamic paperless changeover instructions are generated for the next product while the line is running so that significantly less time is spent changing from one product to the next. Other features include a low part warning system, feeder locators, and component locators to effectively reduce feeder replenishment and changeovers costs. Line Manager also delivers board and component traceability for mission-critical production.

Automatic setup validation

Validates feeder locations during setup and changeover to improve productivity

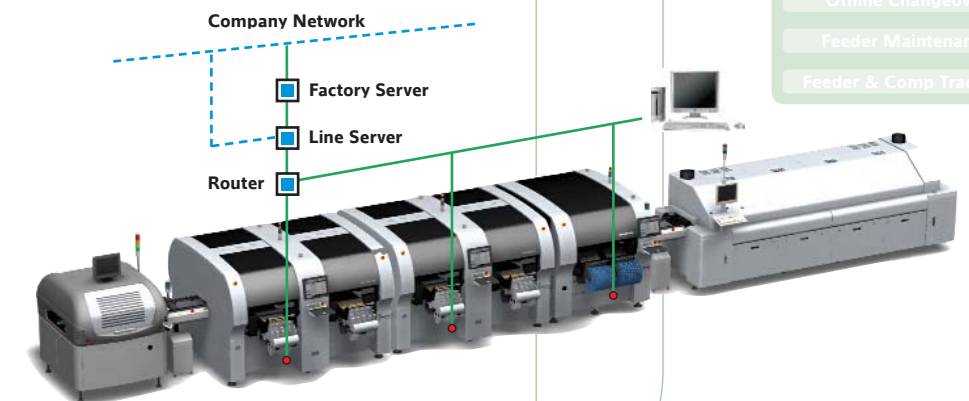
- **Saves time through automation:** eliminates manual scanning at the machine by automatically validating components when feeders are mounted
- **Provides maximum security:** when there is an error, it blocks the machine from running until the correct part is scanned
- **Closed-loop:** checks for errors at the absolute last step in the process (feeder mount)
- **Flexible:** adaptable based on production requirements for different product types



Feeder Low warnings

Minimize downtime for replenishment by pro-actively alerting the operator of feeders that are running low on parts

- **Proactive:** alerts the operators in advance when feeders are running low, allowing them to prepare without stopping production
- **Streamlined:** a single viewpoint across the entire line
- **Splicing support:** alerts operators when it is time to splice
- **Reel quantity management:** tracks the number of parts remaining on each component reel



Component traceability

Protect your brand, save money, ensure product quality, and comply with industry regulations

- **Visibility:** tracks which components went on which boards/circuits
- **Save cost and face:** in the event of a product recall, allows you to recall only the affected boards
- **Ensure quality:** identify which boards need to be reworked before they go out the door

Consumption tracking

Update and manage your parts inventory with accurate, real-time component usage data from your shop floor

- **Visibility:** keep real-time track of your component usage for all UIC platform machines in your factory
- **Integration:** transfer data to your ERP or MES system to manage your inventory using transfer tables

Dimensions[®] Line Manager

- Automatic setup validation
- 'Feeder Low' warnings
- Component traceability
- Consumption tracking
- Offline Setup

Offline Setup

- Offline Changeover
- Feeder Maintenance
- Feeder & Comp Tracking

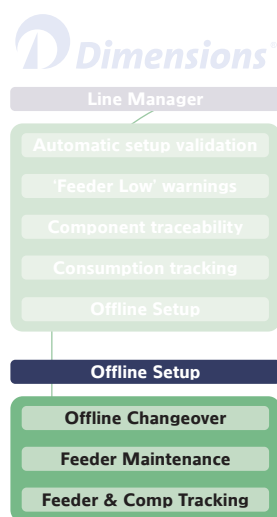
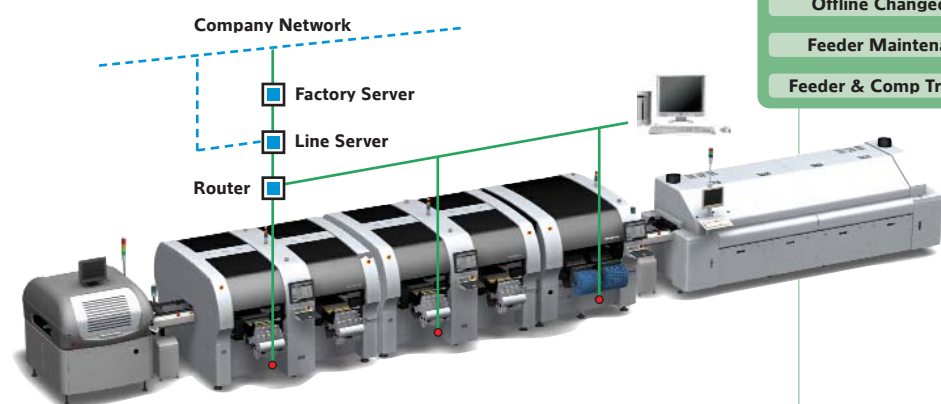
Offline Setup

Offline Setup pro-actively manages changeover and part replenishment. Feeder Low alerts allow feeder or reel preparation while the line continues running, minimizing unnecessary downtime. Feeder and Component Tracking modules help kitting specialists find the feeders and components they need, while technicians leverage Feeder Maintenance to manage maintenance activity. Automatic Setup Validation closes the loop by confirming the feeder locations.

Offline changeover

Assures that everything's ready when it's time to change over, without stopping production

- **Maximize utilization:** enables operators to prepare feeders offline for the next changeover in advance while the line keeps running the current product
- **Maximize efficiency:** generates instructions that tell operators exactly what to do to change over
- **Monitor progress:** keeps track of the operators' progress as they execute the instructions



Feeder and component tracking

Locate feeders and parts at the point and time of use

- **Efficiency:** save time searching for feeders and parts
- **Convenience:** search for feeders and parts from the point of use: machines, setup station, or anywhere else
- **Integration:** transfer data from other tracking/MES systems into Line Manager

Feeder maintenance

Automatically track & manage periodic maintenance and repair for all your feeders and improve feeder performance

- **Proactive:** alerts you to when feeders are due for periodic maintenance
- **Streamlined:** keeps track of the maintenance and repair history of each individual feeder
- **Centralized:** manages all of the feeders in your factory from one central database
- **Accessible:** viewable on any Maintenance/Setup Station

Performance Reporter

Gain visibility into the performance of your Genesis lines from anywhere in your factory. Performance Reporter provides real-time data for line throughput, efficiency, cycle time, and pick defect rates, all through your web browser. Use Performance Reporter to help you stay on target and meet your performance objectives.

- Dynamic, real-time production data at a line level
- Viewable from any web browser with access to network
- Server can be located anywhere on factory network

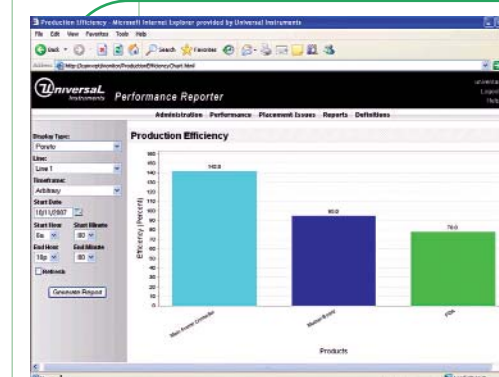


- Line-level reports
- Real-time production data
- Web-based access

Line-level reports

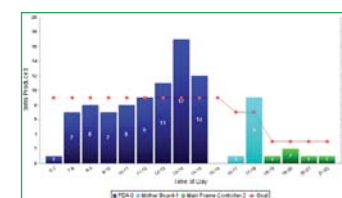
Daily reporting system, including alerts and equipment information, with web-based access

- **Real-time data collection:** collects line-level consumption data on a per-board basis
- **Performance data, including:** hourly board count, production efficiency, cycle time charts, and machine states
- **Placement issues data, including:** component mis-picks, feeder mis-picks, component rejects, component scrap

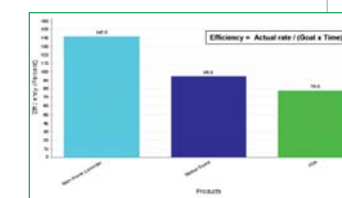


Sample reports

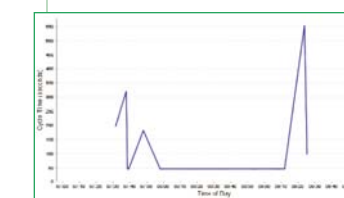
Hourly board count



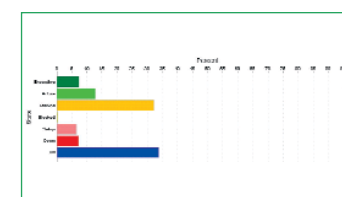
Production efficiency



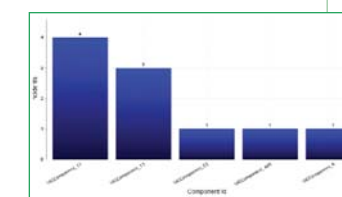
Cycle time



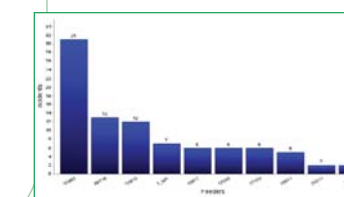
Machine states



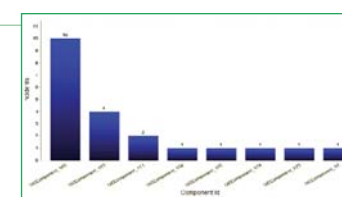
Component mis-picks



Feeder mis-picks



Component rejects



Component scrap

Station Id	Component Id	Total Picked	Total Placed	Scrap Quantity	Scrap PPM
HSC1	Component_665	745	680	65	87248
FJ1	Component_67	234	203	31	132478
HSC1	Component_151	655	640	15	22900
FJ1	Component_112	89	76	13	146067
FJ1	Component_532	24	12	12	500000

Equipment information

Date & Time	Description	Status
2007-10-11 06:02:23.0	Circuit Count updated. Command: 0. Product: LB_7104322-9P2_#02	ACTIVE
2007-10-11 00:02:24.0	Product loaded. Product: LB_7104322-9P2_#02	ACTIVE
2007-10-11 06:02:27.0	Machine is ready to zero. Push START to begin.	ACTIVE
2007-10-11 06:02:27.0	The requested mode change is now complete.	ACTIVE
2007-10-11 06:02:33.0	Machine exiting Production/Waiting for Operator Submode	ACTIVE
2007-10-11 06:02:36.0	Machine zeroing in progress.	ACTIVE