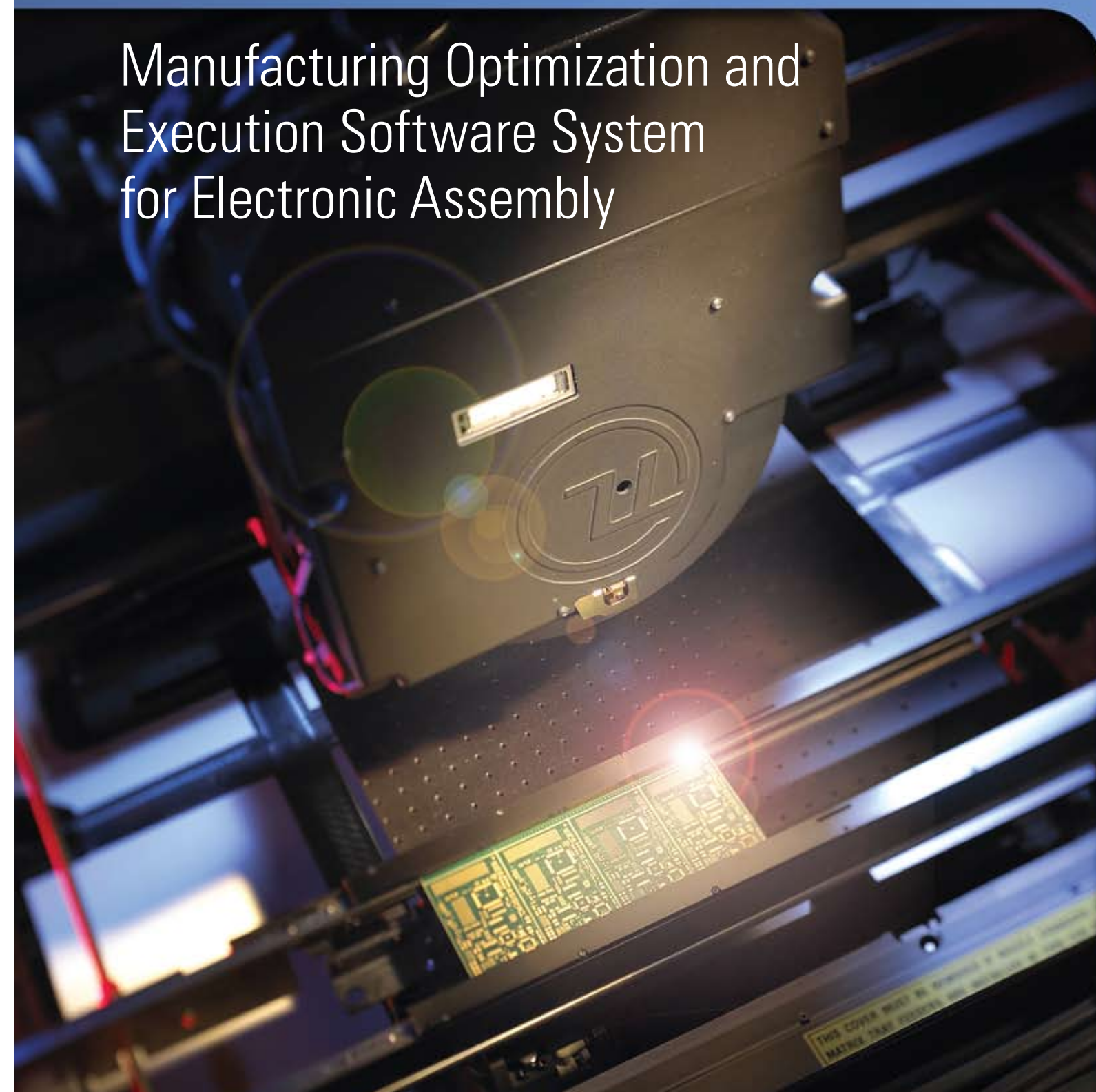


Optel™ Complete Manufacturing Control and Optimization

Manufacturing Optimization and Execution Software System for Electronic Assembly



Dynamic Production Scheduling

The powerful and configurable Dynamic Production Scheduling module is the key to competitiveness and profitability in a high mix, low volume environment. It improves order fulfillment by better meeting due dates and enables people to spend time planning rather than reacting to alarm situations. Simulation of multiple production plans enables better decision making and reduces bottlenecks. This module creates and maintains an active schedule for all assembly lines, balancing the entire factory based on available resources.

- Powerful algorithms that have been honed over many years do what computers do best: consider the many variables and resources in a production environment then optimize them to achieve production objectives.
- Supports different optimization objectives, such as minimizing makespan, minimizing feeder changeovers between setups, earliest due date
- Considers line balancing as well as line-to-line balancing, even in a multi-vendor environment
- Supports efficient hot job handling, providing quick and easy rescheduling capabilities to quickly react to production disruptions and emergencies
- Grouped setups can be generated, kitted, setup and verified off-line, reducing setups by 3–6x
- Routing instructions, line setup, and machine setup documents are automatically generated
- Simulates estimated work order completion time and assembly line performance measures

Dynamic Production Scheduling Example

Automated Multi-Vendor Machine Programming and Optimization

Automated Machine Programming & Optimization quickly generates highly optimized machine programs for various SMT and THT equipment vendors.

- Optel's proprietary algorithms deliver 5% or more throughput on SMT machines, reducing cycle time and delivering superior asset utilization
- Accepts assembly information in popular CAD/CAM formats to create assembly programs
- Existing programs can be read from machines, stored as golden programs in the central database, and sent as required to machines.
- For maximum flexibility and agility, programs are generated as needed for scheduled setups, ensuring the most current information from the central database is used

Machine Control, Verification, and Automated Traceability

Real-time communication between Optel and equipment in the process center provides complete visibility and control.

- Controls screen printers to ensure lead-free paste and stencils are used on lead-free assemblies—a must when supporting a mix of regular and RoHS assemblies.
- Sends machine programs from the central database to the machine based on work order
- Performs a final online setup verification to ensure the right feeders and components are loaded
- Machine performance information can be captured and viewed in real-time, including every feeder event
- Eliminates manual parts counting, adds inventory integrity to ERP/MRP systems
- Provides accurate, automated component level traceability
- Enables an effective feeder management strategy based on duty cycle instead of calendar days, reducing machine downtime and lowering maintenance costs
- Supports reel splicing for uninterrupted replenishment
- Takt time measurement checks if the solder paste is past its tackiness spec to prevent the panel from entering SMT machines

Traceability Report Example for a PCB Serial Number

Real Time Material Tracking Reduces Inventory, Eliminates Wrong Parts Placed, and Ensures Regulatory Compliance

Optel offers an automated and comprehensive material management system that picks up where MRP leaves off, and closes the loop with MRP. It provides real-time visibility to all material on the shop floor, including warehouse, point of use storage, on machines, and at manual and rework stations. Prevention of wrong parts usage delivers fast ROI by reducing scrap, improving quality, and ensuring RoHS compliance.

- Real-time tracking of material location and quantity
- Scrap data collection and reporting per work order, component, material, and feeder
- Reporting on every transaction a material ID (license plate) went through
- Supports manual and automated (carousel) material storage systems
- Tracks and controls “out of bag” time for moisture sensitive devices (MSD)
- Eliminates misplaced parts via closed-loop part verification
- Traceability supported per reference designator for SMT, THT, manually placed, & reworked components through system assembly (a.k.a. box build)
- Temperature, humidity and oven profiles can be monitored and logged for process traceability
- Enhances ERP/MRP systems, adding inventory integrity via automated inventory counts and eliminating manual component counting

Material Management View

Flexibility, Scalability, Management, and Integration

Only Optimal Electronics delivers a modular and complete “pay as you grow” solution for electronic assembly. A solution can be tailored to each customer’s unique requirements to minimize disruption and fit their budget, whether it’s closing a gap in a large enterprise or installing a complete solution for a new operation. Modeling tools permit centralized management of all manufacturing information, including the component library, assembly data, and factory resources. By leveraging the power and flexibility of the industry standard SQL database, detailed information is available in real-time on material location, quantity, WIP, machine performance, and traceability reports. Optel’s automated data feeds provide inventory integrity to ERP/MRP systems and improve decision making.

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Optel™ is the most comprehensive and powerful software system for managing and optimizing the PCB manufacturing process. This modular software suite implements Lean Manufacturing best practices and delivers increased agility, throughput, and quality. Optel ensures manufacturing compliance, inventory accuracy, and reduces costs throughout the operation. Optel has been in use since 1998 by many Fortune 500 Companies that have benefited from the rapid Return on Investment (ROI) and continued competitiveness the system delivers.

Optel Picks Up Where ERP/MRP Leaves Off

Many companies look to ERP/MRP systems to provide control over their manufacturing. These systems provide value—especially to the finance and supply chain departments—but manufacturing teams need additional tools.

MRP Systems Do	MRP Systems Do Not
Order and track material within the warehouse	Manage material and WIP in real-time throughout the factory
Provide lot level tracking of materials	Provide component level traceability to ensure regulatory compliance, such as RoHS and 13485, and minimize the extent and cost of recalls
Require manual counting of partially used reels, trays, and other materials before returning to the warehouse	Automate cycle counting and component traceability for inventory integrity
Generate work orders	Perform production scheduling of work orders to balance manufacturing resources and minimize change-overs
Track and rationalize cost	Import CAD/CAM data and generate optimized machine programs

Without a Manufacturing Execution System (MES) like Optel, factory processes are often manual, sub-optimal, and “open loop” to ERP/MRP systems. The critical and complex task of production scheduling is typically done on a whiteboard or simple spreadsheet. Given all the variables and data involved, scheduling is a very challenging problem to perform manually. Unexpected changes due to customer demands, such as hot lots and prototype runs, often void the schedule. Kitted material, machine setups, and other functions critical to efficient manufacturing processes are all affected.

Multiple vendors machines, each requiring specific programming, setup and verification, increase the complexity. Rather than fight with the different programming software each machine vendor supplies, factories will often simply dedicate certain lines to certain products. This results in missed schedules, overtime pay, added shifts, multiple scattered libraries and assembly programs, and inefficient use of capital equipment across the factory. True Lean Manufacturing is unattainable in this environment.

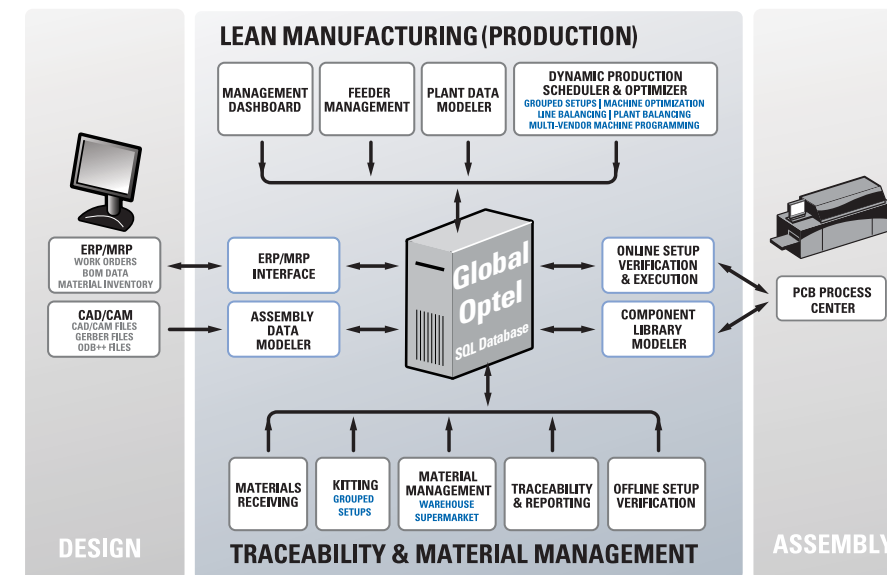
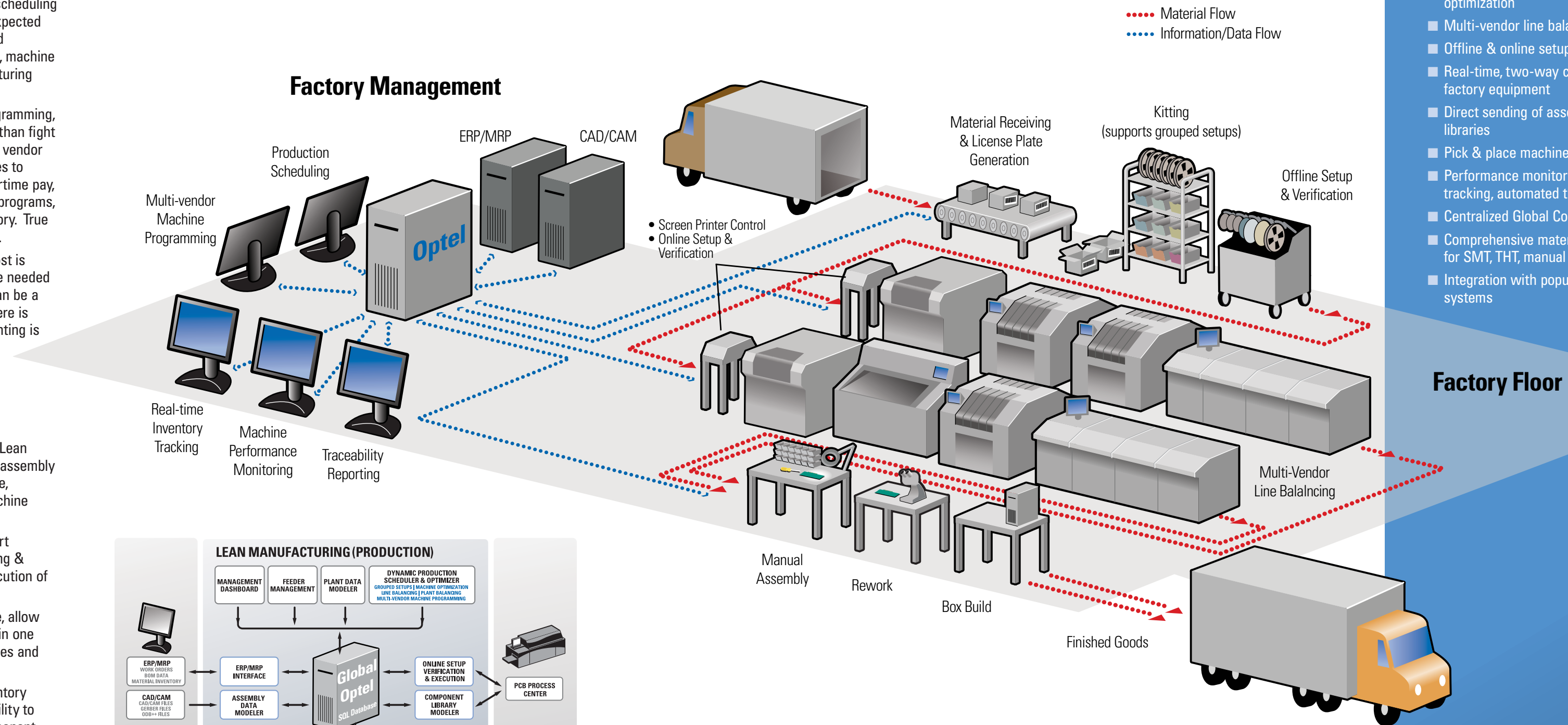
To reconcile ERP/MRP to actual production, standard cost is used at completion and periodic physical inventories are needed to keep the ERP/MRP system current. Standard cost can be a pleasant surprise (profit) or a bad one (loss). Worse, there is no visibility to WIP in the factory and manual parts counting is inefficient, error prone, and too late.

Optel: Lean Manufacturing Made Profitable

Optel makes high mix, low volume electronic assembly efficient and profitable, transforming factories into true Lean Manufacturing operations. All aspects of the electronic assembly process are automated and optimized wherever possible, eliminating non-value-add activities and minimizing machine downtime.

- Dynamic Production Scheduling, working in concert with automated multi-vendor machine programming & optimization, enables efficient scheduling and execution of high product mixes
- Modeling tools, working off a centralized database, allow the management of all manufacturing information in one place, eliminating duplicate and inconsistent libraries and programs
- Material management modules add real-time inventory tracking throughout the factory, providing full visibility to WIP, advanced parts outage notification, and component level traceability— thus eliminating wrong parts placed, reel chasing, and other non-value-add activities
- Leverages industry standard SQL database, for flexibility and the power to scale to the largest operation

Optel’s ability to control and optimize all aspects of a circuit assembly factory is unparalleled in the market.



Overview of Optel Product Suite

Optel Capabilities Include:

- Dynamic production scheduling & rescheduling
- Grouped setups minimize changeovers by a factor of 3-6x for high product mixes
- Multi-vendor SMT & THT machine programming & optimization
- Multi-vendor line balancing & line-to-line balancing
- Offline & online setup verification
- Real-time, two-way communication between Optel & factory equipment
- Direct sending of assembly programs and component libraries
- Pick & place machine optimization and control
- Performance monitoring, error reporting, WIP tracking, automated traceability
- Centralized Global Component Library & Modeler
- Comprehensive material management & traceability for SMT, THT, manual & rework processes,
- Integration with popular ERP/MRP & CAD/CAM systems