640 N Prospect Dr
Whitewater, WI 53190

Phone: 262-458-1000
FAX: 262-458-1010
Web Site www.ueinc.com

November 12, 2013

# A New Advance in PCB Assembly Prototyping

***Adding value at each step***

While the first electronic contract manufacturing (ECM) firms provided only basic production-line board stuffing and reflow services, the ECM industry has evolved over several decades in response to changes in both technology and the business environment. Today, the leading U.S. ECM suppliers deliver a much wider range of services, offer substantially greater engineering depth, and produce completed and tested products much more quickly than was possible in the past.

A prime example of increased ECM capability is NPI-Plus, a new product introduction (NPI) service developed by Universal Electronics, Inc. (UEI). Unique to the industry, this program helps OEMs bring products to full production very quickly while avoiding potentially costly developmental errors. Headquartered in Whitewater, Wisconsin, UEI began contract electronics manufacturing in 1980, as OEMs began out-sourcing their printed circuit assembly production.

“When electronics companies began to move board assembly operations overseas to reduce costs, many experienced serious challenges in the important transition from design to manufacturing,” said Ray Cottrell, UEI vice president, sales and marketing. “It can be very difficult to manage life-cycle support issues at a distance, and it is critical that details such as bill of materials (BOM) analysis, design for fabrication (DFF), design for manufacturability (DFM) and design for test analysis (DFT) are fully addressed locally before releasing assemblies for production.”

## New Product Introduction Services

As a result, Cottrell explained, UEI developed the new service, using an integrated set of tools to provide new product introduction services to electronics OEMs, whether their final production is handled off-shore, in-house, or at one of UEI’s domestic facilities. A primary goal of the service is to minimize time-to-market for customers. Called NPI-Plus, this program is helping customers bring products to market faster and more cost-effectively.

“The goal of NPI-Plus is to see that manufacturing issues are addressed and resolved during the design phase,” explained Travis Grob, VP of operations at UEI. "Some customers have told us that in the past, inadvertent errors in BOM timing or data accuracy have resulted in products brought to market with components that were reaching the end of their life cycle. NPI-Plus helps our customers avoid this and other serious problems through early participation and support.”

640 N Prospect Dr
Whitewater, WI 53190

Phone: 262-458-1000
FAX: 262-458-1010
Web Site www.ueinc.com

UEI's standard new product introduction metrics are aggressive and focused on exceeding client prototype demands, including quote delivery within 48 hours for turnkey assemblies (Figure 1). The company commits to have the entire BOM for a project entered into their system within 24 hours of receipt of a purchase order, all materials orders placed within 48 hours of BOM entry with the goal of all materials delivered within five days of PO receipt, and finished, fully tested assemblies shipped within five business days of material arrival on the factory dock.

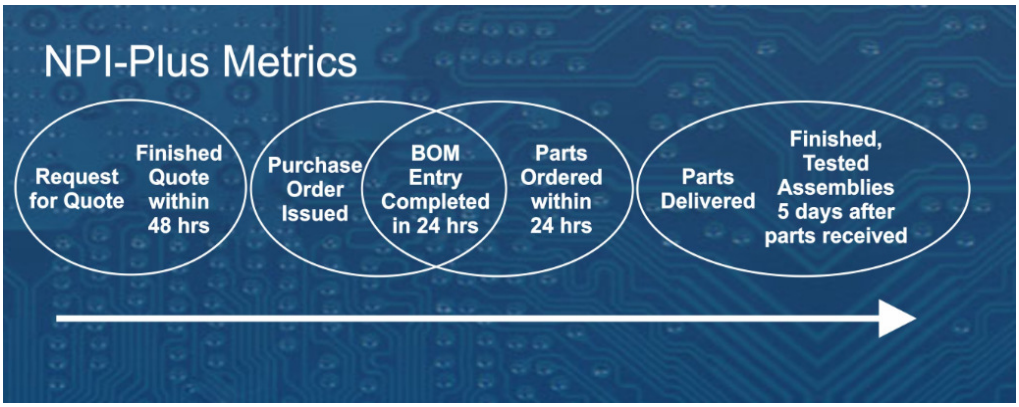



*Figure 1 - The NPI-Plus timeframe is compressed, helping OEMs move PCBAs from concept to production efficiently, without missing any of the important steps in the sequence.*

**Powerful, Integrated Software Tools**

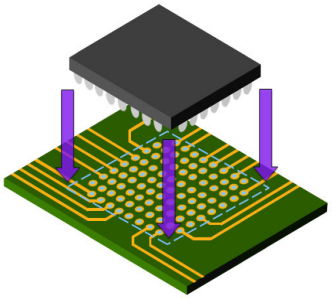
According to UEI, the NPI-Plus program rests on several key elements, including powerful integrated software tools, data gathering and reporting, and precise supply chain analysis. UEI maintains a dedicated NPI manager, highly qualified staff and specialized equipment in order to add value at the front end of the production cycle.

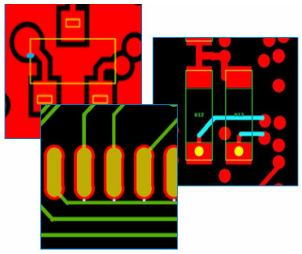
The NPI-Plus process starts with data entry into a powerful software package called Valor® MSS, which directs each phase of PCB manufacturing all the way from new product introduction to final assembly and test. The elements of this program include front-end DFA analysis, BOM validation, stencil design and SMT programming, as well as testing and inspection.

The first Valor test is Design for Fabrication (DFF), applying 296 rules to the raw-PCB to analyze for any violations. Next is Design for Assembly (DFA), reviewing more than 35 million manufacturing part numbers to place parts on the board and check for possible violations.
Finally, Design for Test (DFT) reviews netlist verification, net accessibility, test pad geometries and clearance, as well as full ICT test coverage.

640 N Prospect Dr
Whitewater, WI 53190

Phone: 262-458-1000
FAX: 262-458-1010
Web Site www.ueinc.com



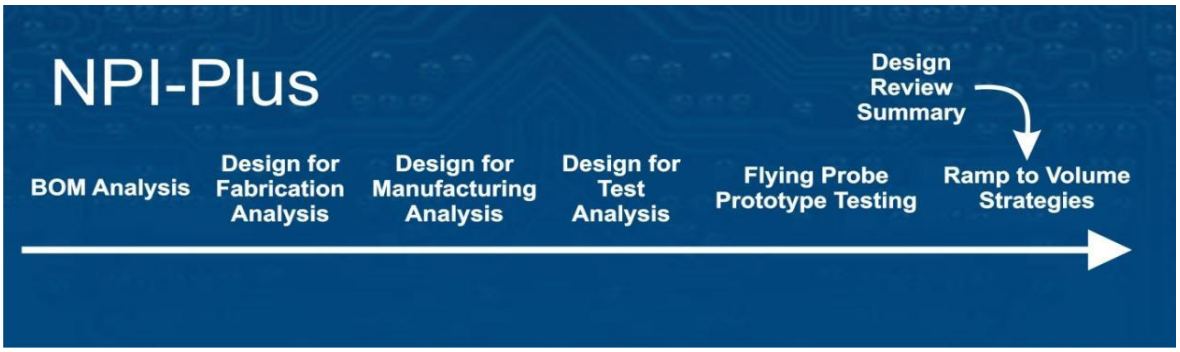


***Pictures above represent Valor MSS examples***

The Valor tool has been shown to reduce the incidence of redesign by 57-percent compared to non-supported new product efforts, resulting in an average material cost of $28,000 per design. Complimenting OEM's internal design efforts and getting it right the first time is an important value-added function of NPI-Plus.

A parallel NPI-Plus activity is rapid bill of materials analysis using SiliconExpert® Technology's BOM Manager. This program confirms supplier name and part number information for every device and material specified for PCBAs, instantly delivering up-to-date data for thousands of parts, with life cycle status, sourcing information, RoHS and REACH details, availability, data sheets, life cycle data, and other details required to optimize part choice and sourcing decisions. BOM analysis can be repeated as necessary during any stage of the build.

"These tools make it possible for us to provide clients with design confirmation or very specific modification suggestions very early on, before the concept moves from design to prototype," said Grob. "A detailed report, ready in 48 hours or less, includes BOM analysis as well as DFA and DFT conclusions. Unlike traditional contract manufacturers, UEI takes an engineering-centric view of electronic production rather than a manufacturing-centric approach, and incremental design feedback continues throughout the production cycle."



640 N Prospect Dr
Whitewater, WI 53190

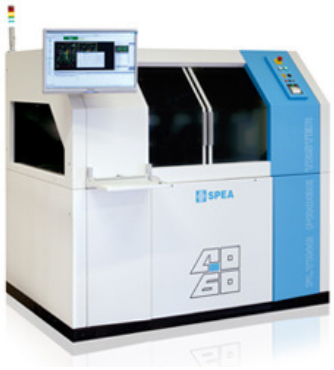
Phone: 262-458-1000
FAX: 262-458-1010
Web Site www.ueinc.com

*Figure 2 (above) - The NPI-Plus steps to product introduction are sequential, ordered, and effective, resulting in a Design Review Summary that covers every critical detail and helps avoid costly deficiencies.*

With this NPI-Plus approach, the focus is on expediting time-to-market by reducing build cycle times. By bringing incremental design and prototyping tools and resources earlier into the NPI process, the odds of executing a successful and cost effective launch are dramatically increased. Cottrell comments, "We are working with early stage medical companies as well as Fortune 100 technology companies that have different internal resources available to them. They have found substantial value in using NPI-Plus to validate and compliment their existing engineering resources while providing them with supply chain data for their purchasing teams. "

**Fixtureless Testing and Fast Delivery**

In addition to the design and supply chain analysis UEI completes the prototyping or NPI process by adding SPEA Flying Probe fixtureless testing on every prototype. This is standard in our NPI-Plus process and offers further verification on your assembly. Grob states, "We do all of this and delivery product to our clients within 5 business days once we are material clear."




*SPEA Flying Probe used in NPI-Plus testing*

**NPI-Plus Design Review Summary Report**

UEI then delivers the NPI-Plus Design Review Summary Report that encapsulates the results of each aspect of PCBA design. This is a very detailed summary report and provides an analysis and DFM checklist that covers key project details with comments to ensure that all bases have been covered. The BOM Analysis section provides overview ratings of lifecycle, multi-sourcing, environmental and inventory aspects of the design, along with specific notations as required. A DFA analysis section covers individual PCBA trace and pad details, bottlenecks, vias, SMD clearances and other critical features by location coordinates. Finally, DFT analysis rates all top and bottom side potential test points to confirm board functionality, and infers design modifications necessary to optimize test accessibility

640 N Prospect Dr
Whitewater, WI 53190

Phone: 262-458-1000
FAX: 262-458-1010
Web Site www.ueinc.com

**Adding Value through Sequential, Informed Decision Making**

"NPI-Plus is focused on minimizing time-to-market for our customers," Cottrell concludes. "By dedicating substantial staff and system resources, being involved in new product efforts early on, and covering all of the intermediate bases without fail, we can ensure that manufacturing issues are addressed and resolved during design, when it is most cost-effective. Even customers with substantial engineering resources appreciate UEI's ability to qualify and validate their designs, and tie prototypes to supply chain and purchasing environments. The unique power of NPI-Plus helps us ensure that the transition from initial product design through prototyping, production and distribution is seamless and efficient."

xxxxx

For more information, contact Ray Cottrell, 262-458-1003, or email rcottrell@ueinc.com. Visit www.npi-plus.com. NPI-Plus is a trademark of Universal Electronics, Inc.