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CIRCUITI STAMPATI PROFESSIONALI - MICROFOTOINCISIONI

UNI EN ISO 9001:2000
Cert. N° 9101.EFFERegistration Number
IT - 31072

VIA ALDO MORO, 11/13 – 50019 SESTO F.NO – FIRENZE – Tel: 0554211241 – Fax: 0554215122 – Email: info@effei.it

DESIGN FOR MANUFACTURING – VALOR TRILOGY 5000

I vantaggi nell'usare Trilogy 5000 si possono così riassumere:

- accurato controllo e verifica del layout con le regole internazionali (IPC)
- eccellenza del prodotto attraverso la verifica fisica e completa dei dati di progetto
- minimizzazione dei tempi nel ciclo progetto-produzione
- comunicazioni certe tra progettisti, costruttori, assemblatori con lo scambio dati "intelligenti" ODB++
- produzione di dati precisi e verificati a zero difetti
- validazione dei progetti

Manufacturing Engineering Solutions

Pre-production engineering solution for NPI, design validation, DFM, assembly preparation and optimization, test and factory floor documentation. Valor's engineering solution (a.k.a Trilogy) eliminates the data problems experienced by most electronics manufacturers by integrating all incoming logistical and engineering data into a single database for elegant, efficient pre-production and communication. Once Trilogy captures all the relevant data, it is ready to be analyzed and optimized for manufacturability and assembly. Productivity is doubled, component and manufacturing resources are optimized, and the final product is much more reliable.

BOM and AVL integration using Valor component library service (a.k.a VPL) for Data Verification and Accurate Analysis Trilogy brings full integration of logistical component data (BOM/AVL) with the design/engineering data. This technology breakthrough is made possible by the VPL, the assembly industry's first fully integrateable part/package library. VPL completely eliminates time wasting searches of paper or electronic catalogs by providing physical package information on-line. You benefit from fully automatic input, verification and crosschecks between BOM/AVL and engineering data (Gerber files, component placement lists, netlists, etc). With accurate parts data intelligently captured within the ODB++ database, your Trilogy pre-production analysis and optimization processes will correctly plan the fabrication, assembly and test stages of the manufacturing flow.

Absolute machine simulation; the foundation for comprehensive assembly-line optimization
Based on the same backbone of ODB++ data, Trilogy provides full kinematics modeling of assembly machines together with multi-algorithm optimization routines to achieve best performance with any individual product or combination of products. Entire assembly lines are balanced for optimum feeder allocation, and total resource utilization is optimized, whether for single products on stand-alone machines, or multiple products to be manufactured over multi-platform assembly lines. In parallel, optimized data files for solder stencil cutting, bare-board fabrication and in-circuit testing are output, together with comprehensive customized reports and factory-floor documentation, to deliver a full manufacturing dataset from one unified and verified source.

Intelligent Data: More Accurate Data; More Accurate Assembly



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With the ability to pinpoint and fix potential problems before you proceed to the line planning and program generation stages, scrap is virtually eliminated. Trilogy is based on ODB++, the IPC data format standard (IPC 2581) in place at thousands of design and manufacturing sites worldwide. ODB++ consolidates CAD/EDA intelligence and the PCB manufacturing knowledge base into a single, open, expandable database. Now, not only are all engineering tasks - from input to program generation, and everything in between - integrated into one database, but true vertical integration throughout the industry is finally achievable. Significant operational efficiency and quality improvements are achieved with clean, validated, optimized data fit for right-first-time manufacturing.

Engineering Station

Core platform for controlling your engineering process. Supports all ODB++ based engineering functions, providing an integrated engineering solution for your entire workflow process, from input of design and BOM-data, right through to output of production-ready machine-driver files. The input capabilities include all common CAD and CAM data formats which, when combined with interfaces to the BOM Manager and Valor Parts Library, empower you to construct the most comprehensive data model available of the printed circuit assembly to be manufactured. Following a full rules-driven DFM analysis and manufacturability optimization phase, Engineering Station supports all process-preparation functions, including panelization, generation of shop floor instructions, manufacturing drawings, solder-paste stencil cutting programs and placement and inspection machine driver-files.



NPI

CAD Input

Direct input of PCB layout files, for maximum manufacturing data intelligence.

Trilogy reads all major PCB layout formats, including multiple variants from Mentor, Cadence, Zuken, Altium, and more. Minimize CAD/CAM data exchange costs, in preparation for BOM/AVL merging to build the full ODB++ database for onwards engineering processing.



CAM Input

Widest range of CAM data input to support reverse engineering and process preparation. Automatic input all commonly encountered CAM formats, including Gerber, GenCAD, FATF, Excellon, IPC-D-356, HP-GL, DXF, IDF and much more.



CAM Output

Multiple format outputs in support of 3rd-party manufacturing and tooling applications.

Beyond the comprehensive machine, fixture and documentation outputs of Trilogy, you have a wide choice of additional CAM outputs, including Gerber, GenCAD, Excellon, Postscript, FATF, IDF, IPC-D-356, DFM Sharelist, and more.



you

BOM Manager

BOM and AVL parsing and validation, ready for NPI engineering.

Bills Of Material (BOM) and Approved Vendor Lists (AVL) can come in a wide variety of forms, layouts and syntaxes. The BOM Manager provides a comprehensive set of tools to read incoming logistical data files -regardless of format - based on intelligent logic-driven templates. Following parsing, BOM/AVL data is set against the Valor Parts Library for validation. Once saved in a validated form, the BOM file is ready for input to the ODB++ jobs database of the Engineering Station, and can also be input to master PDM and ERP systems, to support materials-procurement processes.



Component & Solder-Paste Extraction

Powerful reverse-engineering tool for extracting component and solder-paste data. When faced with an incomplete set of engineering data as input, for example when only Gerber data is available, rules-based algorithms scan the graphical pad-patterns and extract component-footprint groups, locating centroids and building solder-paste data. Component orientations can be input, for support of component placement program generation downstream in the engineering flow.



Parts Library Manager

customization access to the VPL.

VPL supports extensive customization, either to create and manage extended process-attributes of the packages within your local library, or for creation of package entities for customized or specialist components. The Parts Library Manager provides full functionality for definition of component parts and packages, according to the same principles as used by Valor in its centralized VPL-support operation.



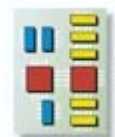
Graphic Synchronization

Graphical hot-links between Trilogy and the source CAD-system establishes direct feedback to the Designer's database. Once the CAD database has been read into ODB++, Trilogy provides intelligent graphical links directly to top-tier CAD systems, so that, at the touch of a key, the designer can review any design features - with identical zoom and positioning - in both the CAD system and Trilogy . Graphic Synchronization enables rapid review of your DFM results from within the PCB layout environment, maintaining data consistency and integrating Trilogy vertically into the design process.



Engineering Station Automation License

Double your NPI process productivity. Enables scripts to drive the system by line-mode commands, and also use of the powerful "info" command, which queries the ODB++ database for records to drive decision-loops in automation routines.





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Documentation Editor

Authoring package for all factory-floor drawings and instructions, drawing maximum intelligence and automation from the ODB++ database. Create color-coded manufacturing documentation to drive each logical step of the production process. Documentation Package supports selection of components and instructions by manufacturing process, controlling set-up of automated assembly lines, manual assembly, inspection and rework instructions. Documents produced are available for printing or on-line access with the Trilogy Documentation Viewer.

3D VRML Simulator

View the product in 3D immediately after input, before committing to manufacture!

Using sophisticated 3D visualization tools based on Virtual Reality Modeling Language (VRML), the Trilogy provides the technology to view the assembled board as soon as it is



within the ODB++ job database. Visualizing the product in this way provides a quick and visually rich means of assessing component layout relative to assembly and general design requirements.

Understand the general design characteristics at the earliest possible stage, to support quoting and meaningful customer communications. Valor provides an open industry standards based solution.

VRML files are easily passed to the customers for remote viewing to support DFM and pre-production engineering decisions.

Assembly/Test Analysis

Advanced manufacturability review for the assembly/test process. Using ODB++ intelligence and a shape-based algorithmic kernel, the system's advanced

Assembly/Test Analysis programs allow any user to catch manufacturing defects before the product arrives on the manufacturing floor. Assembly Analysis programs

deal with problems unique to assembly such as component spacing, fiducials, test points, outlines, etc. This powerful package delivers extensive reports and full automation for over

100 categories in 5 major actions: Fiducial Analysis, Component Analysis, Padstack Analysis, Testpoint Analysis and Solder Paste Analysis.



Bare-Board Analysis

Enhanced fabrication design analysis . Trilogy Bare-Board Analysis provides a comprehensive engineering tool which allows the PCB manufacturing engineer to verify manufacturability of the bare board. Based on sophisticated contour

algorithms, Bare Board Analysis detects possible manufacturing issues early in the process, allowing DFM engineers to identify potential problems in advance and define solutions,

which optimize fabrication and assembly/test considerations, concurrently. This powerful package delivers extensive reports and full automation for over 100 categories in 5 major actions: Signal

Layer Analysis, Power and Ground Analysis, Silkscreen Analysis, Solder mask Analysis and Drill Analysis.



HDI Fabrication and Microvia Analysis

Dedicated fabrication analysis algorithms for HDI substrates provides two upper-level analysis modules, suitable for BGA-substrate and chip-on-board (COB) applications, appropriate to conventionally-laminated multilayers and also sequential-build-up technology. HDI Analysis extends the range of physical verification analyses to check minimum etch spacing between all combinations of feature type (selected by attribute), including spacing between solder-mask, all categories of conductive features and interconnect-vias, and components. Conductor angles are verified against pre-set criteria, and analysis takes into account whether layers are core-type or build-up.



Netlist Analyzer

Compares original netlist data to "as designed" netlist extraction to provide electrical integrity assurance. Netlist Analyzer uses real-time rasterization techniques to extract a true interconnectivity map of any PCB in a matter of seconds. After comparison against a reference netlist, either the logical netlist from the CAD system, or any other reference, differences are highlighted to pinpoint graphical elements responsible for any failures of netlist integrity ("opens" or "shorts"). A powerful tool which gives the manufacturing engineer the tools for verifying final design data integrity before committing resources to manufacture.



DFM Programs

Manufacturing level PCB design enhancements for optimized yield.

Multiple rules-driven algorithms support manufacturing design-data optimization for cost reduction, yield enhancement and quality consistency. Multiple functions support silk screen optimization, sliver filling, copper balancing, pinhole elimination, signal layer optimization, solder mask optimization, and more.



Solder Stencil Design

Intelligent algorithm-based fixture design. Subtle differences in stencil aperture sizes and shapes have significant impact on soldering yield. Taking into account component type, footprint and pad shapes, and lead free considerations, Solder Paste Optimization adapts the solder stencil apertures to best match the process constraints representing stencil thickness, paste type, print speed etc. Percentage coverage of solder paste, as well as aperture aspect ratio limits, are controlled across the board, by this repeatable function, in a matter of seconds.



Documentation Viewer

On-line shop-floor documentation viewing.

The Trilogy documentation viewer supports rapid intelligent viewing of structured data, for maximum clarity and focus at each production stage. Documents are based on a hierarchical data structure, with full OLE capability. Document delivery can be via a





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simple networked directory file-structure, or by client-server access with centralized 3rd-party document-control systems.

Line Balancing

Optimization of all aspects of assembly machine and line balancing.

Delivering optimum feeder set-up, minimum tool changeovers, balanced feeder utilization and minimum cycle time. Absolute kinematics modeling of the machines brings accurate cycle time calculations in advance of committing to production and enables a true re-iterative solution constantly seeking to remove the bottleneck.



Includes the capability to read existing machine programs and libraries and re-engineer them for different machines, supporting job-mobility. Feeder set-up is balanced across a complete assembly line for maximum throughput. Line Balancing generates maximum productivity for a complete line, for any combination of machines, including from multiple vendors.

Product Grouping

Minimization of line downtime when handling families of products. Product Grouping takes into account the requirements of multiple designs to deliver a line set-up consolidated and optimized to match the requirements of your forward load of jobs, or a "family of parts" group of jobs. Using sophisticated algorithms, including full re-iterative line balancing, overall line productivity takes a massive leap forward in the case of high-mix manufacturing operations.

Machine Shapes Manager

Centralized control of your SMT component-shape machine-libraries.

Machine Shapes Manager consolidates all of your machine-level component libraries across multiple machine platforms into one validated centralized library, serving your entire factory. With total consistency of data to the machines, set-up times are minimized, and quality and job-portability are maximized. Machine Shapes Manager concentrates on pulling together dispersed machine-level data sources, editing and rationalizing the content, creating new shapes-data with rules checking for validity, and delivering maximum efficiency of parts data management at the machine-programming level.



Virtual Sticky Tape

Neutralization and correction of SMT component rotations. Trilogy neutralizes all CAD rotations, regardless of the source design, into a Valor standard rotation. Once programming output are generated, using the machine library parts data, Trilogy graphically displays the true simulated as placed rotation and compares this to the original as designed orientation. This allows for all rotation issues to be quickly resolved and verified off-line, avoiding costly machine down time for program debugging.



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Assembly Machine Optimize/Output

A wide range of machine types and vendors is supported; including Fuji, Sanyo, Universal, Panasonic, Siemens, Assembléon, Yamaha, Juki, and more.

When combined with the Line Balancing, Grouping functions, and Virtual Sticky Tape rotation correction, the dedicated machine models and output processors deliver ready-to-run machine programs for maximum efficiency and productivity.



Assembly Machine Input

For re-engineering of existing line set-ups. Supports Fuji, Universal, Sanyo, Siplace, Panasonic, allowing existing machine programs to be read into Trilogy for re-engineering and output ready for assembly lines supplied by a different vendor.

AOI/AXI Outputs

The ODB++ database of Trilogy delivers intelligent data pre-formatted for input to multiple AOI/AXI machines, including

Vi-Technology, Orbotech, Omron, Agilent "5DX", and more, reducing set-up time from hours to minutes.



ERF Manager

Rules Management for maximum DFM efficiency

vital system-support tool for Trilogy DFM users. ERF Manager supports efficient management of DFM analysis and optimization rules, delivering user-friendly rules-entry and review, including logical checking routines to monitor the rules-editing process.



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