Integrating E³'s ECAD to NX Routing Electrical

Nikolaos Aplitsiotis

We apply nanomanufacturing technology to improve the way people live.
Personal Information

- Nikolaos Aplitsiotis (Applied Materials – Santa Clara)
- Worked in different areas of Product Development
- Part of SME group responsible for corporate PLM software strategy and solutions
- Currently supporting Teamcenter Engineering, NX Routing Applications and the corporate CAD Library
- Responsible for the deployment, integration and overall strategy and methodology for E³s (ECAD application)
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Applied Materials’ Overview

- Applied Materials, Inc. is the global leader in nanomanufacturing technology solutions with a broad portfolio of innovative equipment, service and software products for the fabrication of semiconductor chips, flat panels, solar photovoltaic cells, flexible electronics and energy efficient glass.
Applied Materials’ Overview

- Applied Materials creates and commercializes the nanomanufacturing technology that helps produce virtually every semiconductor chip and flat panel display in the world. The company recently entered the market for equipment to produce solar arrays and energy efficient glass.


- Visit: www.appliedmaterials.com
Discussion Points

- Vision - Using E³s in PLM
- Integrating E³s Component Library to TCE
- Integrating E³s to NX Routing Electrical
- Data Management in TCE
- Next Steps
E³s overview

- E³s is an ECAD tool provided by Zuken

- “CIM-Team (A Zuken Company), the electrical CAD specialist, present the E³.series suite of integrated, state-of-the-art, Windows®-based design tools for electrical control system design and documentation. Whether it's E³.schematic, for the creation of control schematics, terminal plans, BOMs, & Wire Lists, E³.panel, for the complete design of control panels, including layouts and wiring, or E³.cable, for the development of detailed wiring, cabling and harness designs, E³.series makes the process fast, efficient and accurate. “

Source: Zuken.com
Using E³s in PLM - Concurrent Eng.

Mechanical Design

1. MCAD Master Layout

Electrical Design

1. ECAD Master Layout
Using E³s in PLM - Concurrent Eng.

- MCAD Master Layout
  - Visibility to all stakeholders (designers, manufacturing..)
  - Better real estate management
  - Early agreement on cable routing paths, cable channels, bundles

- Creation of preliminary routing paths
  - Logical Data/Net List (Component/connection list)

- ECAD Master Layout
  - Detail Design of cable harness

- Auto Route/Parametric Modeling
  - Interference check
  - Automatic collision analysis
  - Check for design rules
  - Preliminary View of end product
Using E³s in PLM – Master Layouts

MCAD Master Layout - Product Representation
- Includes all cables, cable harness, pneumatics etc.
- Includes options and variances

ECAD Master Layout – Complete product electrical design

Teamcenter Engineering

Lightweight Visualization Data

Transfer Exact Cable/Wire Length

Complete Bill of Materials
Using E³s in PLM - Collaboration

- Lightweight 3D Data
  - MFG, Marketing, Suppliers
- E³ Viewable Project
  - MFG, ENG, CE
- BOM Visibility
  - SCM, MFG, ENG

Internal/External Customer Collaboration

- DFx Activities
- Virtual Build
- Digital Mock Up

- Order/Receive Parts on time
- Cost Effective Prototype Build
- Cables Fit
- No re-work

Completion of Cable Harness Design

- Auto creation of BOM
- Eliminate human error

Integrating E³s to NX Routing Electrical – Nikolaos Aplitsiotis, Applied Materials Inc.
Current State

- Using E³s 2007.630
  - E3.cable (multi user)
  - E3.view

- TCE 9.1.3.6

- NX3
Integrating E³s Component Library to TCE

- **Attribute Based Search**
  - TCE Classification is utilized as the main application for component attribute based search
  - E³s component library resides in a central Oracle database
  - Upon E³s component creation, component attributes transfer automatically from TCE Classification to E³s

- **Benefits**
  - Single location for component attributes
  - Efficient and easier to maintain
  - Network library enables multi site usage
Integrating E³s Component Library to TCE

- Classification
  - Utility
  - Credentials Check

- Attribute Transfer
- Daily sync to copy sites <30sec

- TCE DB
- E³s DB Lead Site
- E³s DB Replica Copy Site A
- E³s DB Replica Copy Site B
- E³s DB Replica Copy Site X
Integrating E³s to NX Routing Electrical

- BoM is controlled in E³s and it is transferred to TCE PSE
  - Reference Name
  - No geometry components

- Teamcenter Community is used as the collaboration tool between Electrical and Mechanical functions to initiate the 3D cable routing

- NX Harness Assembly
  - Automatic availability of components for placement
  - Automatic assignment based on reference name
Data Management in TCE

► Current State

► Lack of integration with TCE requires numerous manual steps

► Multi User Functionality not integrated to Teamcenter Engineering
  ► In current state, Multi User Project is independent of TCE, operating on its own and it requires a lot of effort to synch multi user projects with TCE.
  ► Multi User functionality does not support multi site TCE environment and users have to be on the same site. Applications like Citrix or Blade Remote Servers can be used to create a common environment
Data Management in TCE

ECAD Master Layout
- $E^3$s Project - Complete Design
- $E^3v$ - Intelligent viewable
- PDF - Static view

Product level project that contains block, interconnect, schematic, cable drawings and all configurable options

System Schematic
- $E^3$s Project - Schematic
- $E^3v$ - Intelligent viewable
- PDF - Static view

System specific project that contains block, interconnect and schematic with only applicable options

Electrical Design
- PDF - Static 2D of cable drawing
- NX Part with parametric cable
- Zip with cmp/hrn info
- BoM view

Cable/ Harness level drawing documentation
Next Steps

- Complete integration with TCE
  - Data Management, Multi user, File Associativity, Viewer
  - Support for all data objects and meta-data – all E3.series files (E3s, E3v etc.)
  - Options and Variances in E3s to be integrated with TCE
  - Access controls from TCE to E3s
    - Trade restrictions, IP protection
    - Component Library and project level
  - Change Process/ workflow integration
    - Electrical designs are controlled by the ECAD Master Layout but they exist as different objects in the PDM. These objects are subjected to different policies and any change must be initiated and reflected from the ECAD Master Layout
Next Steps

- Utilize Mechatronics methodology in TC2007
  - Integration with MCAD
    - Automatic transfer/update of logical data, bill of materials and cable lengths
    - BoM cost roll out
    - Weight

- Fully integrated component library

- Utilize
  - E3.formboard
  - E3.configurator
  - E3.fluid
“Users don't know what they want until you give them what they ask for.”

"An old saying in software development“, according to Kent Beck