

UGS CONNECTION



AMERICAS 2008



Siemens PLM Software

SIEMENS

Integrating E³s ECAD to NX Routing Electrical

Nikolaos Aplitsiotis



We apply
nanomanufacturing
technology to improve
the way people live

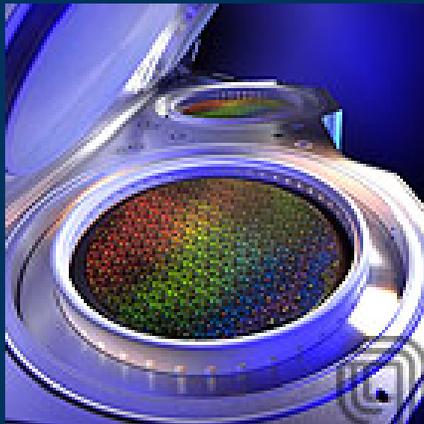


Personal Information

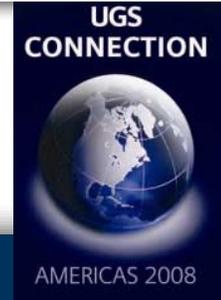
- ▶ Nikolaos Aplitsiotis (Applied Materials – Santa Clara)
- ▶ Worked in different areas of Product Development
- ▶ Part of SME group responsible for corporate PLM software strategy and solutions
- ▶ Currently supporting Teamcenter Engineering, NX Routing Applications and the corporate CAD Library
-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

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

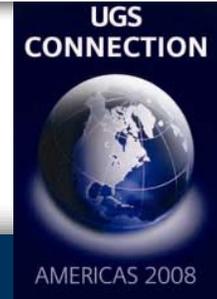


Applied Materials' Overview



- ▶ 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.
- ▶ Applied Materials employs approximately 14,500 people throughout the world. In fiscal year 2007, Applied Materials recorded net sales of U.S. \$9.7 billion.
- ▶ 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

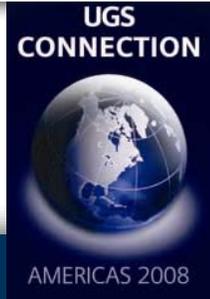
E³s overview



- ▶ 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. “

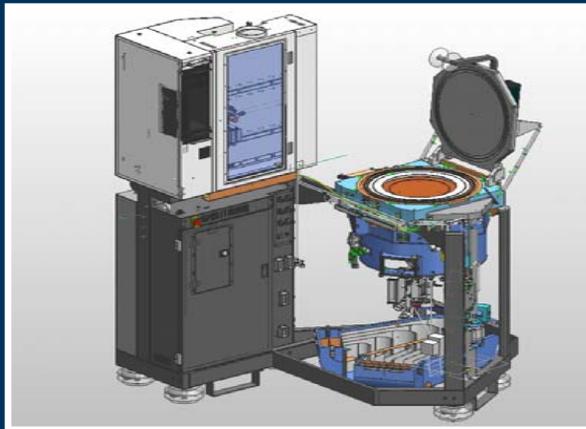
Source: Zuken.com

Using E³s in PLM - Concurrent Eng.



Mechanical Design

1



MCAD Master Layout

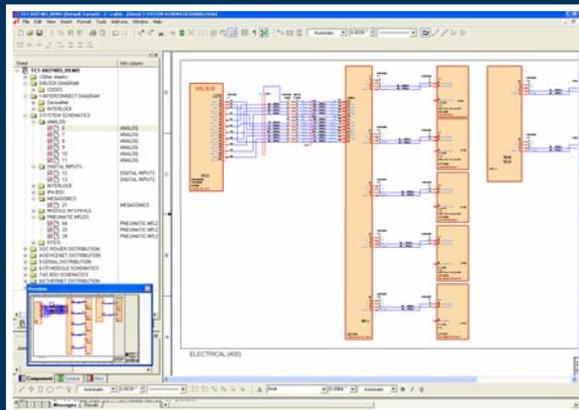
Assembly Navigator

Descriptive Part Name	R..	M..	Posi...	Count	Reference Set
TC1-0424640/001				1550	
TC1-0263406/000				18	ROUTING
TC1-0263406/000				18	ROUTING
TC1-0328171/002				89	ROUTING
TC1-0425553/001				66	ROUTING
TC1-0425554/001					Lightweight ("FACE
TC1-0425571/001					Lightweight ("FACE
TC1-0425571/001					Lightweight ("FACE
TC1-0425820/001					Lightweight ("FACE
TC1-0430805/001					Lightweight ("FACE
TC1-0431177/001					Lightweight ("FACE
TC1-0432793/001				943	ROUTING
TC1-0328828/004				171	
TC1-0062830/000					
TC1-0062830/000					
TC1-0243892/001				77	
TC1-0048968/000					

MCAD Structure

Electrical Design

1



ECAD Master Layout

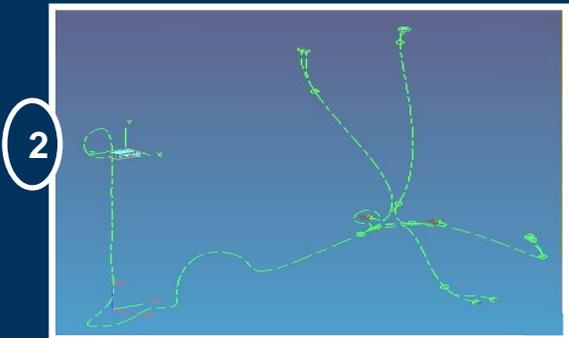
AMAT PN CABLE/HARNESS

Placement
TC1-0427403_DEMO
0090-
0090-05210
JBR3401 0090-05210 PLENU...
0090-05211
0090-05212
0090-05213
0090-05233
0090-05236
0090-05237
0090-05239
0090-05240
0090-05241

ECAD Structure

Using E³s in PLM - Concurrent Eng.

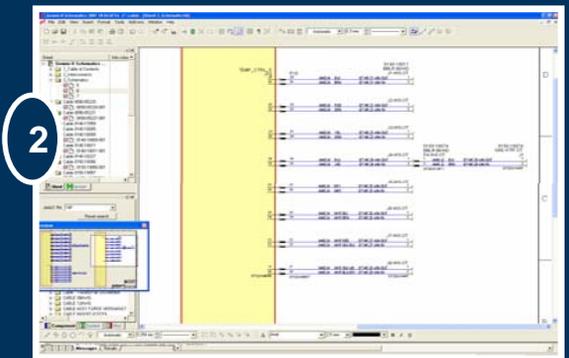
MCAD Master Layout



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

Creation of preliminary routing paths

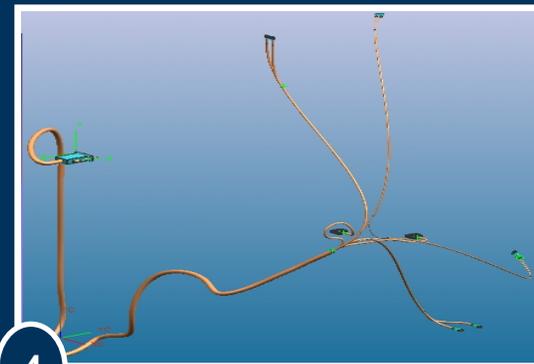
ECAD Master Layout



Logical Data/
Net List
(Component/
connection
list)

3

Detail Design of cable harness



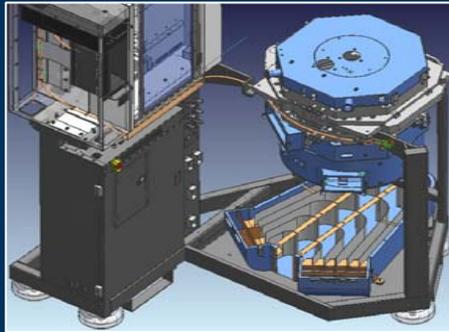
Auto Route/ Parametric Modeling

- Interference check
- Automatic collision analysis
- Check for design rules
- Preliminary View of end product

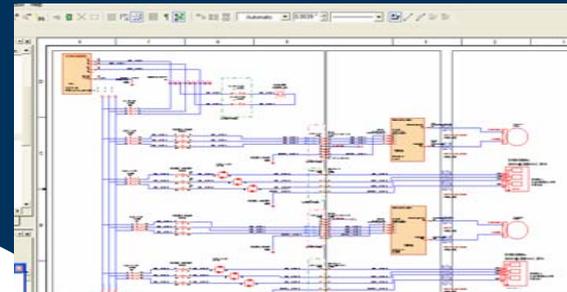
Using E³s in PLM – Master Layouts

MCAD Master Layout - Product Representation

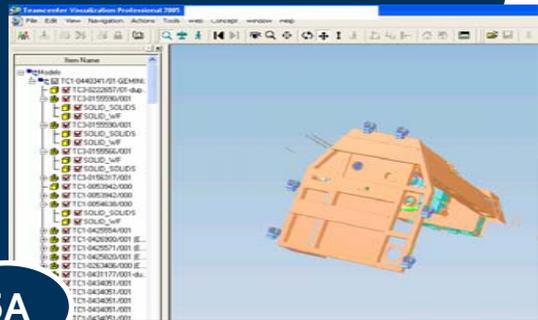
- Includes all cables, cable harness, pneumatics etc.
- Includes options and variances



ECAD Master Layout – Complete product electrical design



Teamcenter Engineering



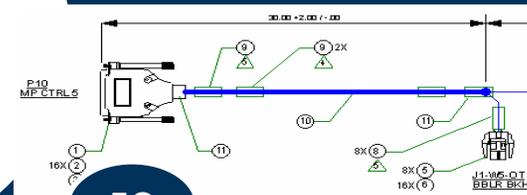
5A

Lightweight Visualization Data

5B

Item	Description	Quantity	Material	Unit	Release Status	Release Date
TCS-0129868	001 Assembly_kit	...	RELEASED, E	596		
TCS-0101900	001 Assembly_kit	...	RELEASED, E	220		
TCS-0101730	002 Mech_Design	...	EVAL	20		
TC1-0042082	000 OEMItem	...	RELEASED, P	10		
TC1-0042082	000 OEMItem	...	RELEASED, P	20		
TC1-0042495	000 OEMItem	...	PRODUCTION	50		
TC1-0042495	000 OEMItem	...	PRODUCTION	60		
TC1-0042744	000 OEMItem	...	PRODUCTION	30		
TC1-0042744	000 OEMItem	...	PRODUCTION	40		
TCS-0160622	001 Mech_Design	...	NON_INVENT	4		
TCS-0101893	001 Mech_Design	...	RELEASED, E	10		
TCS-0101955	001 Assembly_kit	...	RELEASED, E	240		
TCS-0101735	002 Mech_Design	...	RELEASED, E	10		
TCS-0101903	001 Mech_Design	...	RELEASED, E	20		

Complete Bill of Materials

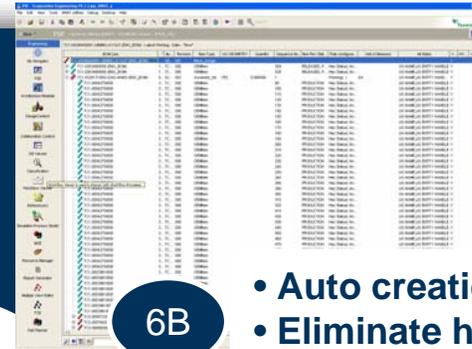


5C

Transfer Exact Cable/Wire Length

Using E³s in PLM -Collaboration

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



- Auto creation of BOM
- Eliminate human error

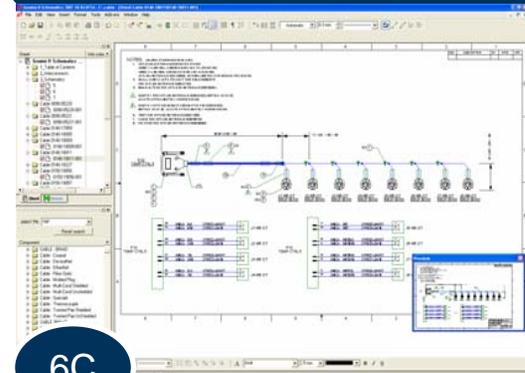
6B



6A

- DFX Activities
- Virtual Build
- Digital Mock Up

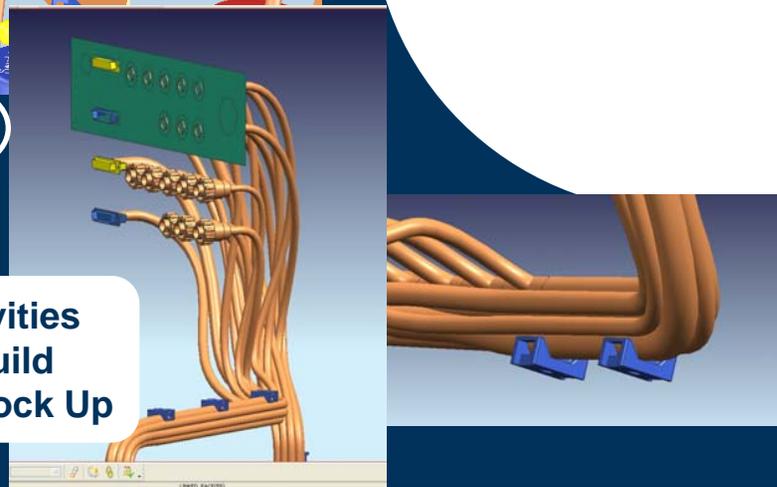
Internal/ External
Customer
Collaboration



6C

Completion of Cable Harness Design

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



Integrating E³s Component Library to TCE



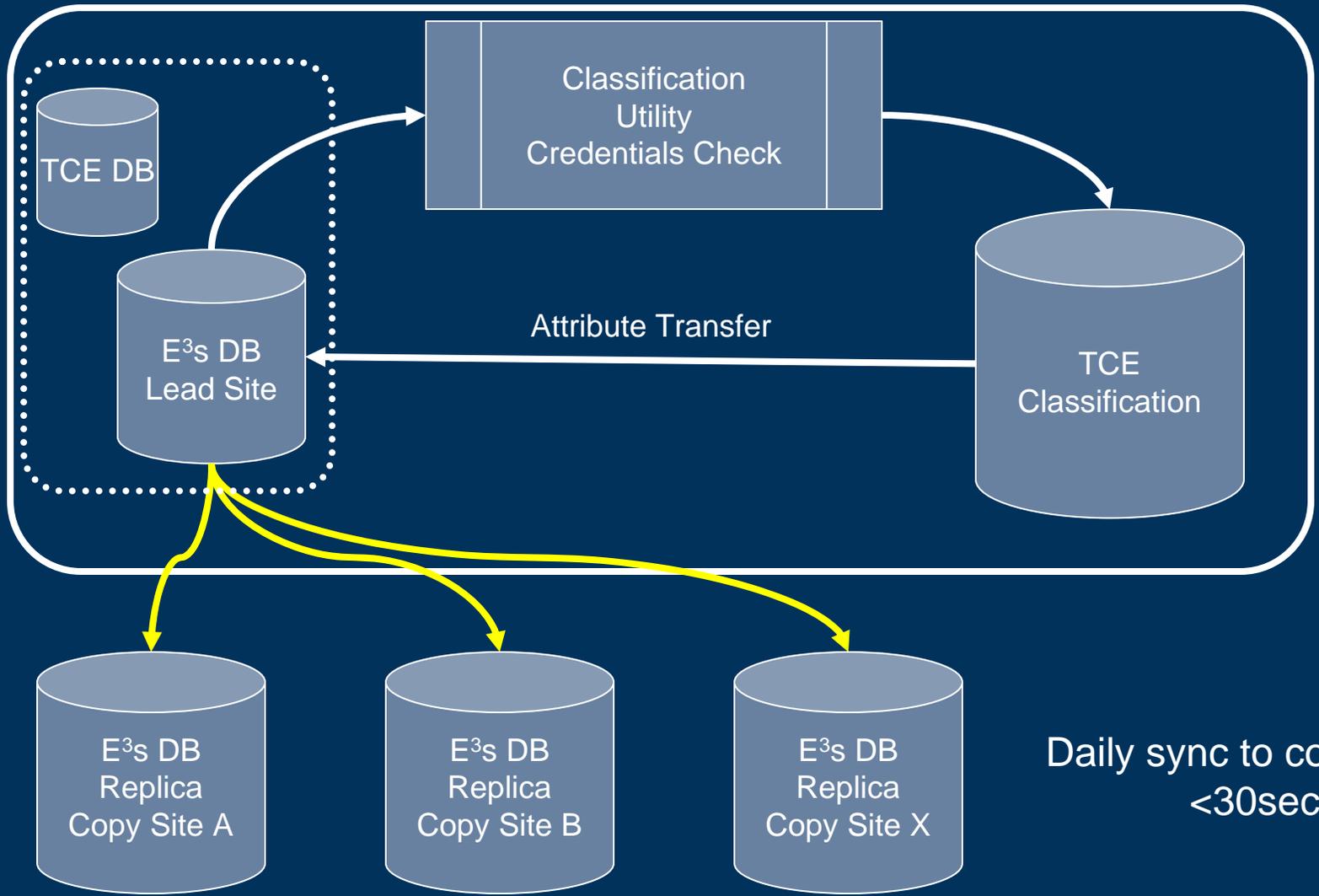
▶ Attribute Based Search

- ▶ 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



Integrating E³s to NX Routing Electrical

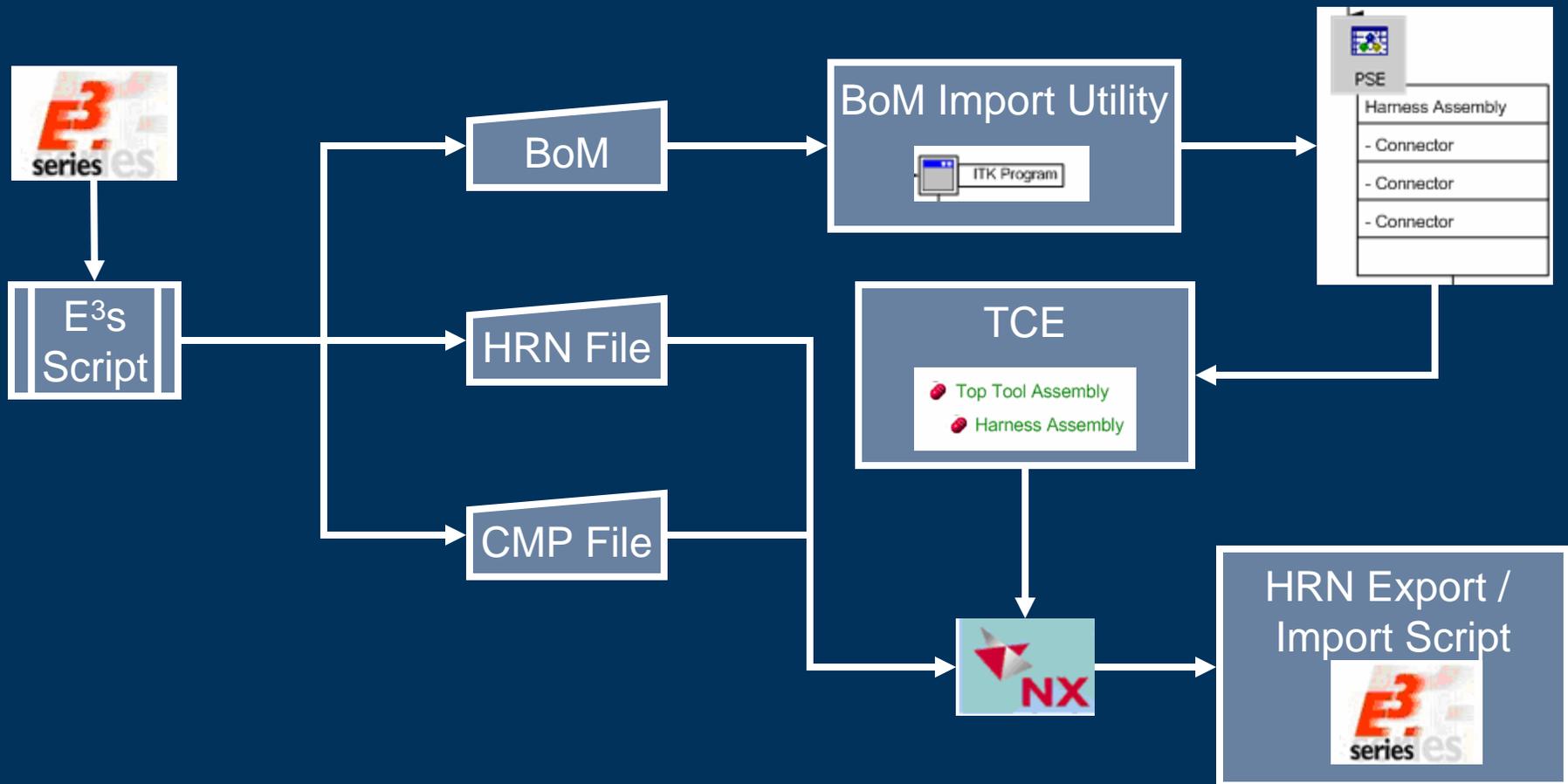
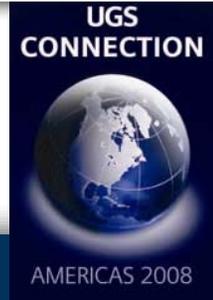


- ▶ BoM is controlled in E³s and it is transferred to TCE PSE
 - ▶ Reference Name
 - ▶ No geometry components

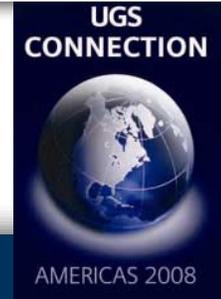
- ▶ Teamcenter Community is used as the collaboration tool between Electrical and Mechanical functions to initiate the 3D cable routing

- ▶ NX Harness Assembly
 - ▶ Automatic availability of components for placement
 - ▶ Automatic assignment based on reference name

Integrating E³s to NX Routing Electrical



Data Management in TCE



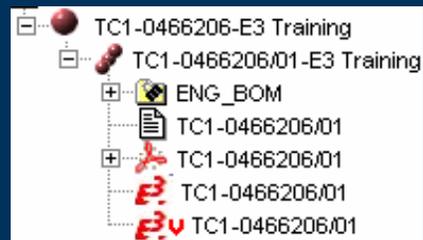
▶ Current State

- ▶ 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

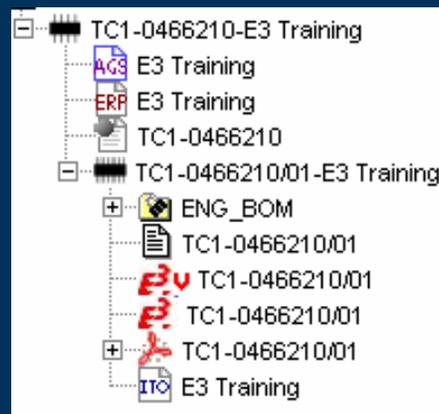
ECAD Master Layout



- E³s Project - Complete Design
- E³v - Intelligent viewable
- PDF - Static view

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

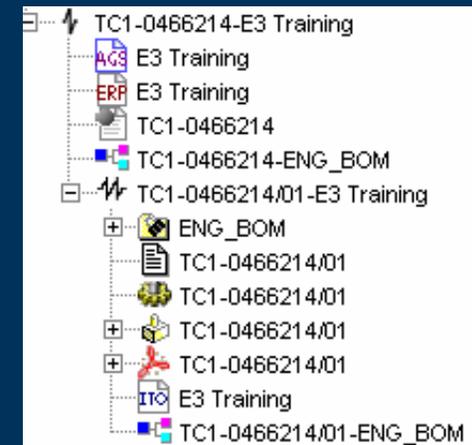
System Schematic



- E³s Project - Schematic
- E³v - Intelligent viewable
- PDF - Static view

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

Electrical Design



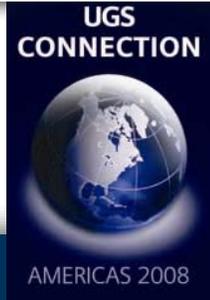
- PDF - Static 2D of cable drawing
- NX Part with parametric cable
- Zip with cmp/hrn info
- BoM view

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

UGS CONNECTION



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“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

Thank You