Integrate

Integration of all E-CAD and Software Authoring Systems and of specific ERP Connectors

Products and Introduction **V1.8**

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1 Scope

Integrate combines Electronic CAD, Electrical CAD, and Software authoring systems with Innovator to provide fully-automated creation and synchronization of electronic/electric/software design and postprocess data. BIZ Connect integrates Innovator with specific ERP systems.

1.1 Highlights

Integrate

- push button operation from the design environment on the user's workstation.

Fully automated process

- saves manual preparation of BOMs and documents. BOMs and documents in Innovator comply with company standards and regulations,
- support of complete project structures with mechanical and electrical assemblies and with data exchange,
- full support of firmware and assembly variants, alternates, and hierarchical structures including re-used blocks,
- configurability in text files based on keywords to the customer's design process,
- support of company processes so that Innovator is used as a turn table of revisioned data in the product's lifecycle for manufacturing, service, ODMs, remote sites, and to synchronize with ERP,
- support of inter-departmental cooperation between mechanical design, firmware development, software development, and electronic design via Innovator,
- support of automatic creation of up-to-date data for fabrication and for the assembly line.

BIZ Connect

- transparent exchange of part data with ERP. Part attributes are mapped in data direction and field assignment. New part numbers are obtained from ERP.
- Workflow-dependant creation of manufacturing BOMs in ERP from Innovator.

2 Integration with Electronic CAD

2.1 Supported Systems

Supported Systems	Application Versions	Operating System Support(1)		
		Windows	Solaris	Linux
Altium				
Protel Capture	99SE+, PMX, 2004	2000+, XP, Windows 7		
Altium Designer	2007 - 2010	2000+, XP, Windows 7		
P_CAD Schematics	2001-2006	2000+, XP, Windows 7		
Bartels				
Auto Engineer	6 - 9	2000+, XP, Windows 7	2.5.1, 2.6	Redhat 3.4, 4+
Cadence Design Systems				
Concept (Scald)	97A	2000+, XP (PE 14), Windows 7	2.5.1, 2.6, 2.7, 2.8	Redhat 3.4, 4+
Concept_hdl	SPB 15+, 16+	2000+, XP, Windows 7	2.7, 2.8, 2.9	
Composer	Opus 4.4+		2.5.1, 2.6	
Mentor Graphics				
Expedition Design Capture	WG 2004/5/6, EE7.9	2000+, XP, Windows 7		
DMGR, DA, LMS (opt.)*, BA (opt)., Package or To Layout	EN 2006-2007 EE2007+, BSXE 7.9	2000+, XP, Windows 7	2.5.1, 2,6, 2.7, 2.8, 2.9	Redhat 3.4, 4+
DXDesigner/DXDatabook or Expedition Capture	2006-2007, 7.9	2000+, XP, Windows 7	2.5 - 2.9	
OrCAD (Cadence)				
Capture	7, 8, 9.2, 10, 16	2000+, XP, Windows 7		
Pads (Mentor)				
Logic	4, 5,9			
Power Logic	5.0+, 2004/5, 9	2000+, XP, Windows 7		
VeriBest				
Design Capture	97A, 98A, 99A-, 2000	2000+, XP, Windows 7	2.6, 2.8	
Zuken Redac				
SCM (XRINF)	5.0.4		2.7+	
CR3000/5000 System Designer	8-13	2000+, XP, Windows 7	2.7+	
CadStar	4.5, 5, 6	2000,+ XP, Windows 7		
Public Domain				
Eagle	All			

Table 1: Logic Design - authoring Systems supported by Integrate

Supported Systems	Application Versions	Operating System Support(1)		
		Windows	Solaris	Linux
Altium				
Board Layout	99SE+, PMX	2000+, XP, Windows 7		
Altium Designer	2007, 8, 9, 10	2000+, XP, Windows 7		
P-CAD PCB	2001 - 2006	2000+, XP, Windows 7		
Bartels				
Auto Engineer	6 - 9	2000+, XP, Windows 7	2.5.1, 2.6	Redhat 3.4, 4+
Cadence Design Systems				
Allegro	SPB 15+, 16+	2000+, XP, Windows 7	2.5.1, 2.6, 2.7, 2.8, 2.9	Redhat 3.4, 4+

Table 2: Physical Layout - Authoring Systems supported by Integrate

Supported Systems	Application Versions	Operating System Support(1)		
		Windows	Solaris	Linux
Orcad PCB	7, 8, 9.2, 10, 16.x	2000+, XP, Windows 7		
Integra				
Integra Station	+	2000+, XP		
Mentor Graphics				
Board Station with Fablink	EN2006-2007, BSXE 7.9		2.5.1, 2,6, 2.7, 2.8, 2.9	Redhat 3.4, 4+
Expedition PCB	WG 2006-2007 EE2007.7, EE2007.9	2000+, XP, Windows 7		
Pads (Mentor Graphics)				
PCB	6.0, 9.2			
Power PCB	5, 6, 2005 - 2007, 9+	2000+, XP, Windows 7		
Zuken				
CR 5000 Board Designer	6 - 13	2000+, XP, Windows 7	2.7, 2.8, 2.9	
CadStar	4.5, 5, 6+	2000,+ XP, Windows 7		
Visula PCB	4.1, 5		2.7, 2.8	
Autoboard Theda	4.1.13, 6.1.2		2.9	
Public Domain				
Eagle	All			

Table 2: Physical Layout - Authoring Systems supported by Integrate (cont'd)

+ All release levels up to the current release level.

2.2 Function List of Integrate Modules with Electronic CAD

Module	Major Functions
Synchronize Parts	• Comparison of electronic parts [which are classified in PLM] with the E-CAD library. • Synchronisation of part state and URL to the data sheet. • Display of designs which are affected by an update. • Interactive or batch control of the update from E-CAD into PLM into "in Work" parts. • Interactive or batch control of the update from PLM to E-CAD of "Released" parts.

Table 3: EDA-Librarian

Module	Major Functions
New Project	• Create the design structure for a new project in the file system from template, file system or PLM. • Establish the initial project structure. • Select Master Board. • Include preparation of documents like for **Board Fabrication**.
Build Data Model	• Full support of assembly and firmware variants. • Creation of data model in PLM with interactive selection to insert the electronic project structure into an existing structure. • Synchronisation of metadata with configurable data direction per attribute. • Execution to dynamically adapt the data model in PLM such as for variants.
Push Design	• Synchronisation of metadata with drawing headers. • Creation of PDF from schematics, supporting text search and bookmarks. • Creation of the netlist. • Building of the design container at first with schematics only, later in the design cycle with PCB data.

Table 4: EDA-Logic

Module	Major Functions
BOM Schematic	• Variant selection. • Creation of the parts BOM structure in PLM. • Support of the quantity table and of a refdes list in PLM. • Graphical BOM comparison with quantity and refdes attributes. • Comparison of the previous BOM in PLM with the current BOM from EDA. • Display of unreleased and missing parts, and pre-programmed devices. • Support of firmware and mechanical accessories. • Support of programming and assembly variants. • Engineering release from check-box for advance material disposition.
Redesign	• Lock design document in PLM. • Increase revision and put into "in Work". • Resolution of the design container of the highest revision into the target directory in the file system. • Refresh of metadata in the design.
Re-use Design	• Resolve design of any state/version/revision into the target directory. • Set metadata to the initial value.

Table 4: EDA-Logic (cont'd)

Produkt	Leistet
Board Fabrication	• Creation of the fab containers with Gerber, drilling, and milling data including technical spec for the fabricator. • Creation of plot from the dimensioned drawing. • Creation of a design image for viewing, redlining, analysis, test, and repair from the PLM client. • Synchronisation of metadata into the drawing frame of the board drawings. • Check-in of the data.
Board Assembly	• Selection of variants. • Creation of top and bottom assembly plot. • Creation of pick & place files for assembly machines. • Synchronisation of metadata into the drawing frame of the assembly drawings. • Check-in of the data.
BOM Layout	• Variant selection. • Update of the BOM in PLM in the board layout view. • Support of subassemblies for SMD, THT, manual for Top and Bottom, based on an attribute. • Enhancement of the refdes table with x, y, rot, side. • Graphical BOM comparison.
Mech	• Creation of IDF, or IGES, or Step, or DXF files for the mechanical CAD assembly. • Reading of IDF, or IGES, or Step, or DXF files from the mechanical CAD assembly. • Support of common workflow of electronic and mechanical CAD in PLM.

Table 5: EDA-Layout

2.3 Steps to configure the Integration of Electronic CAD Systems

2.3.1 Overview

The integration of electronic CAD systems is adapted to the customer's development processes in two steps:

- Configuration document.
- Configuration of the integration, release, and installation.

Configuration documents are created for

- the integration of the electronic CAD system and the design workflow,
- the introduction of part library data in PLM and a configuration of EDA-Librarian for the E-CAD company library.

2.3.2 Pre-requisites

- Technical contact at the customer: name, phone number, e-mail.
- PLM dump if available.

2.3.3 Phase 1: Product Introduction

The steps to arrive at an approved configuration paper:

No.	Step
1-	Customer sends representative test designs with all post processing data and the complete EDA library.
2-	Customer sends construction Bill-of-Materials in ASCII or xls/document form preferred from the ERP system.
3-	Customer sends pertinent workflow description and part number description, if available.
4-	We build a test environment.
5-	We analyze the customer's test cases.
6-	We publish the data collection.
7-	One day JAD (Joint Application Development) session at the customer site.
8-	We publish configuration paper V1.0 for approval by the customer.
9-	We publish configuration requirements for PLM.

The configuration paper includes the chapters:

- system environment and plans in the near future,
- electronic design project structure,
- data model in PLM,
- component classification and attributes,
- document data to be checked in,
- Bill-of-Materials structure and process,
- metadata in drawing frames, document records, PDB, and assembly items,
- ECO cycle,
- multi-site support.

2.3.4 Effort

Case 1: **Synchronize Parts** with part masters: 6 days
Case 2: **Synchronize Parts** with the classified library of parts in PLM: 7 days.

2.3.5 Phase 2: Configuration and Shipment

2.3.5.1 Pre-requisites

The PLM system is configured to support requirements of the data model of the electronic CAD system. A test system is established in the customer site which includes:

- internet browser,
- Innovator client,
- PDF Viewer,
- WinZip,
- text editor,
- access to the E-CAD system,
- access to Innovator server.

This system is used for the first installation. Later, with production release, it may be used as master for the release.

2.3.5.2 Steps

No.	Step
1-	Load the customer application dump.
2-	Configure the integration.
3-	Configure the synchronization of the classification between PLM and E-CAD.
4-	Create customer-specific user guide.
5-	Install the integration on the customer's test system via Webex.
6-	Hotline support during test (3 weeks).
7-	Publish and discuss deployment plan.
8-	Customer approves the integration to go productive.
9-	Install the integration on the customer's productive system via Webex. Pre-requisite: same configuration as the test system.

2.3.5.3 Effort

The effort in phase 2 is assessed here based on past experience. The exact effort can be stated when the configuration paper is approved. The effort to adapt Innovator is not included.

Case 1: **Synchronize Parts** with part masters: 16 days
Case 2: **Synchronize Parts** with the classified library of parts in PLM: 20 days.

3 Integration with Electrical CAD

3.1 Supported Systems

Manufacturer	Product
Aucotec	ELCAD®7.1, 7.2, 7.3, 7.4, 7.5, 7.6
Aucotec	Engineering Base 3.3 - 6+
Aucotec	Ruplan® +
AutoDesk	AutoCAD Electrical 2007, 2008, 2009, 2010
Mensch & Maschine	ecscad® Aero I, Aero II, Aero III
CIM-TEAM (Zuken)	e³series® +
CIM-TEAM (Zuken)	Promis® +
Eplan	Eplan® 5.30 - 5.70, P8 1.8, 1.9 and 2
IGE-XAO	SEE Electrical
Mentor Graphics	Logic Cable® +
ProPlan	ProPlan® +
Bentley	AutoPLANT®

Table 6: Authoring Systems supported by Integrate

\+ denotes the most recent release

3.2 Function List of Integrate Modules with Electrical CAD

Module	Major Functions
Synchronize Parts	• Bidirectional synchronisation of (preferably) classified electric devices. • Interactive or batch operation. • Execution from the E-CAD system or from an icon on the desktop. • Synchronisation of data sheets. • Display list of designs in process which are affected by an update.

Table 7: EDA-Librarian

Module	Major Functions
New Project	• Build new project from template for the engineer. • Pre-assign project attributes and structure including documents.
Build Data Model	• Execute at the begin of the design cycle once. • Build or synchronize the model of the electric project in/from PLM. • Enhance model with added subassemblies.
Check-in	• Extract composite document with cover sheet, VTOC, schematics, connector list, etc. Convert into PDF. Rename PDF file. • Extract project and create zip container. • Check-box: Versioning. • Check-boxes: Pre-release and Release. • Optional Check-box: SPS control. • Check assembly and subassembly documents into PLM.
Redesign	• If the document in PLM is "in Release": increase version, place into "in Work". • Reserve document for this user. • Extract project in one go into the E-CAD project directory. Query before overwrite. • Update metadata in the project.

Table 8: EDA-Cable-Harness

Module	Major Functions
Re-use Design	• Retrieve any version of an project into the E-CAD project directory. • Query before overwrite. • Erase those project metadata which are synchronized with PLM.
BOM	• Create and update BOM in PLM. • Option: Create configurable spreadsheet with BOM data. • Maintain quantity and refdes tables in PLM with location, tag and label. • Create subassemblies as assigned either in the locations in the design or independently. • Show comparison report. • Optional: design grading based on selectable attributes like cost or MTBF. • Support versioned advance Bill-of-Materials for early material disposition. • Pre-release: Release propagate BOM through PLM to ERP.

Table 8: EDA-Cable-Harness (cont'd)

3.3 Steps to configure the Integration of Electrical CAD Systems

3.3.1 Overview

The integration of electric CAD systems is adapted to the customer's development processes in two steps:

- Configuration document.
- Configuration of the integration, release, and installation.

Configuration documents are created for

- the integration of the electrical CAD system and the design workflow,
- the introduction of part library data in PLM and a configuration of EDA-Librarian for the E-CAD company library.

3.3.2 Phase 1: Product Introduction

3.3.2.1 Pre-requisites

- Technical contact at the customer: name, phone number, e-mail.
- PLM dump if available.

3.3.2.2 Steps

The steps to arrive at an approved configuration paper:

No.	Step
1-	Customer sends representative test designs and the EDA library.
2-	Customer sends construction Bill-of-Materials in ASCII or xls form.
3-	Customer sends pertinent workflow description and part number description, if available.
4-	We build a test environment.
5-	We analyze the customer's test cases.
6-	We publish the data collection.
7-	One day JAD (Joint Application Development) session at the customer site.
8-	We publish configuration paper V1.0 for approval by the customer.
9-	We publish configuration requirements for PLM.

The configuration paper includes the chapters:

- system environment and plans in the near future,
- electrical design project structure,
- data model in PLM,
- component classification and attributes,
- document data to be checked in,
- Bill-of-Materials structure and process,
- metadata in drawing frames, document records, and assembly item,
- ECO cycle,
- multi-site support.

3.3.2.3 Effort

5.5 days.

3.3.3 Phase 2: Configuration and Shipment

3.3.3.1 Pre-requisites

The PLM system is configured to support requirements of the data model of the electrical CAD system. A test system is established in the customer site which includes:

- internet browser,
- Innovator client,
- PDF Viewer,
- WinZip,
- text editor,

- access to the E-CAD system
- access to the Innovator server.

This system is used for the first installation. Later, with production release, it is used as master for the release.

3.3.3.2 Steps

No.	Step
1-	Load the customer application dump.
2-	Configure the integration.
3-	Configure the synchronization of the classification between PLM and CAD.
4-	Create customer-specific user guide.
5-	Install the integration on the customer's test system via Webex.
6-	Support test with hotline support (2 weeks)
7-	Customer approves the integration to go productive.
8-	Install the integration on the customer's productive system. Pre-requisite: same configuration as the test system.

3.3.3.3 Effort

The effort in phase 2 is assessed based on past experience.

12 days.

The exact effort can be stated when the configuration paper is approved.

3.4 Optional Add-ons

Module	Major Functions
Star*Select	Associate a part to a symbol in schematics from the part selection in PLM.
bom_back	Update the design with BOM changes which have been edited in PLM.
XMech	Forward a wirelist to the mechanical CAD system.
DCheck	Online check for design rules during schematic capture.
Product Configurator	User tailored menu to select options to create schematics, SPS data, fluidic data, and mechanical data automatically in PLM.

4 BIZ Connect - Transparent Connectors with ERP Systems

4.1 Supported Systems

- PSI-Penta
- Vantage
- Infor (ex. Baan)

4.2 Function List

- Pulling of new part numbers from ERP.
- Mapping of part attributes: data direction, fidd mapping and contents re-calculation.
- Data exchange linked into workflow or into triggering events.
- Configuration of fabrication BOM View.
- Forwarding of BOM from the PLM workflow or from triggering event.

4.3 Steps to a productive BIZ Connect

- Identify the contact person who governs the configuration of the ERP system.
- Review ERP structures and workflow requirements.
- Publish data collection.
- Joint application session at customer site: 1 day.
- Publish configuration paper for approval.
- Configure BIZ Connect.
- Install and verify in the customer site.