



Hello folks

Thanks for joining me today; my name is Scott Claes. In our session today we will discuss the changes/improvements in the ECAD data model and show how we can implement ECAD data storage in PDMLink.

Before we start – a little bit on my background

I'm an EE and I have worked in the industry for 20 years doing board design and obtaining my EE degree.

@ Chrysler for 14 years doing design, project management, etc.

Involved with changes to ECAD tools; selection.

Built designs from test equipment to engine and transmission controller designs built in Huntsville AL. Their production lines produced 62K units/day.

4 years @ PTC

3 years as an independent services consultant configuring ECAD data to be used in PDMLink.

Currently I'm engaged with several US customers and I have experience in many aspects of PLM implementation including business requirements capture, implementation, configuration, and training.

You can see my history on my linked in page: [www.linkedin.com/pub/scott-claes/1/207/738/](http://www.linkedin.com/pub/scott-claes/1/207/738/)

- ECAD Users
- MCAD Users
- Project Managers
- Already using WGM 9.x
- Already using UWGM 10.x
- ECAD data storage in WC without the WGM
- Current state of affairs

Ask – How many of each

Can we do a survey of the room? Hands for # of ECAD users

How many others are already using the WGM?

Anyone storing data without the WGM?

- Data Model
- ECAD Product structure
- Visualization / Collaboration and Compare
- Simple Hook implementation
- NOT Covered
  - Corporate level Processes
  - Tool usage
  - Picks Clicks

Several other aspects of WGM usage could be discussed here

Today we will focus on the data model created when checking data in with the WGM

Applicable to all V10 implementations

By the end of my presentation you will know

The capabilities that ECAD data in WindChill brings to us

- How to “put” ECAD stuff into WindChill

In our presentation today, I’m assuming you are here to gain an understanding of “how to put stuff in WC”  
In many cases I’ve seen this occur as a result of MCAD / Wchill relation ship becoming mature and the organization is looking to become more efficient in other design areas.

I’m assuming we are at the point where we need to at least store data in Wchill.

So lets cover a bit of background

One great advantage of storing CAD data in the PLM system is to attain

Holy grail; “ product structure” from the schematic

ECAD users should leverage MCAD existing processes, knowledge, and workflows where ever possible


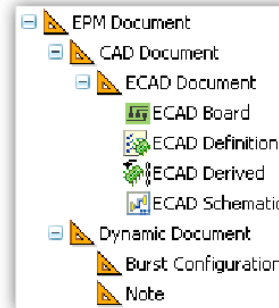
Typically MCAD processes and workflows can be used

Since ECAD isn’t usually too familiar with what’s needed to attain this goal.

Lets cover a bit of TERMINOLOGY




What is a WTPart?

 ASSEMBLY, Backplane PCB, Display Board RES, 10K, 1/4W

WTParts are objects to build product structures. They are associated with any object type in Windchill and do not contain CAD Documents objects, but reference the CAD documents. WTParts can also reference each other in a hierarchy called the product structure. They are symbolized in Windchill by a gear icon. CAD documents contain CAD data; In the MCAD space we see CUBE icon. For ECAD we have a few special Icons to help us identify them.

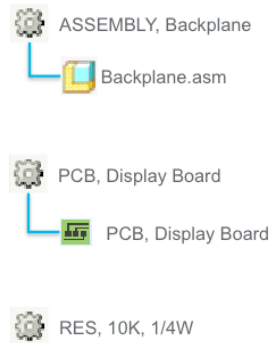
The WTPART is the record master

 ASSEMBLY, Backplane PCB, Display Board RES, 10K, 1/4W

The MCAD case is usually pretty simple.

The ECAD case has a few variations that we will discuss more as we go on.

For now, note that there is the possibility of multiple objects driving the information contained in the WTPart.











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The ECAD case has a few variations that we will discuss more as we go on.

For now, note that there is the possibility of multiple objects driving the information contained in the WTpart.

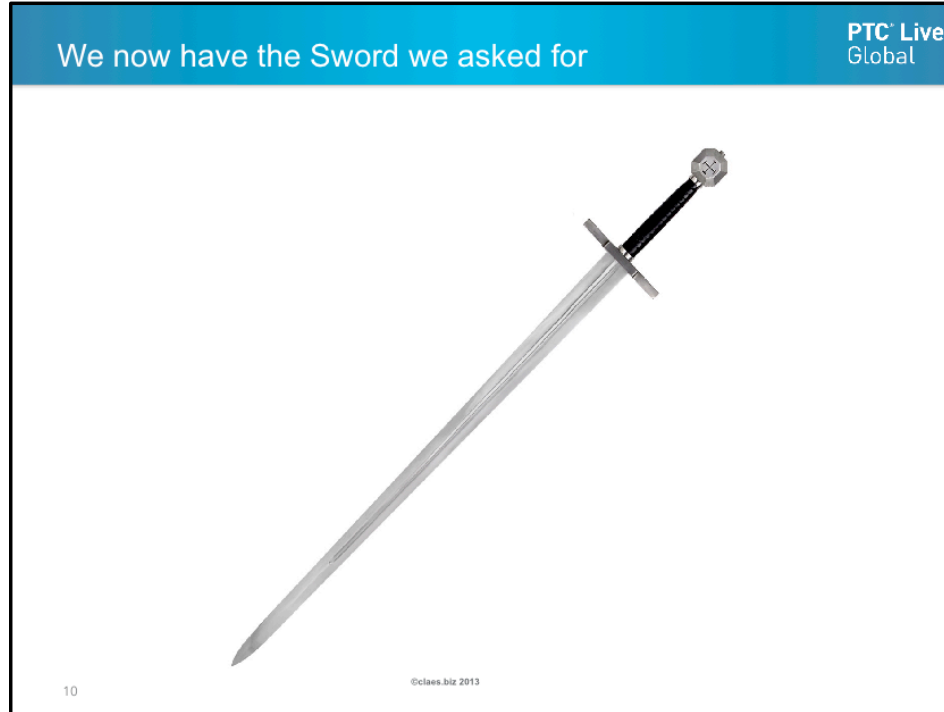


CAD Document Type	Purpose
 ECAD - Schematic	Store Schematic design in Windchill
 ECAD - Board	Store PCB design in Windchill
 ECAD – Derived Data	Store ECAD Data in Windchill; Has a Number and Name – Controlled Object
 Model Item – ECAD Component	Used by Build Services to create Product Structure
 ECAD – BOM Attribute Map	Defines what design attributes to extract/map to Windchill – used to build Model Item Structure and Model Item Link Attributes
 ECAD – Content Definition	Defines design files to collect and store on Parent CAD Document (Schematic or Board)
 ECAD – Hook Definition	Defines a set of custom programs to execute when running "Generate Data" action
 ECAD – BOM Filter Definition	Allows filtering of objects from BOM input prior to processing

**This is the important part;** here are the new cad document types known and understood by PDMLink that apply to our ECAD data

All of these objects are created and managed with the Unified Workgroup Manager

ECAD Derived object has it's own unique name and number; and is also version controlled and contains a workflow  
The bottom group of four objects are content definition objects – used to create and define configurations of the ECAD data



It's big and shiny and can do lots of damage since it's double edged.  
Good because we can discretely manage and change all of the elements that we want.  
For example independently revise the board, without revising the schematic.  
Bad because there are a lot of things we can configure.

**Schematic Data Files / Folders**

DESIGN.SCH  
DESIGN.NET  
DESIGN.CSV  
DESIGN.PDF



Schematic.ZIP

**PCB Data Files / Folders**

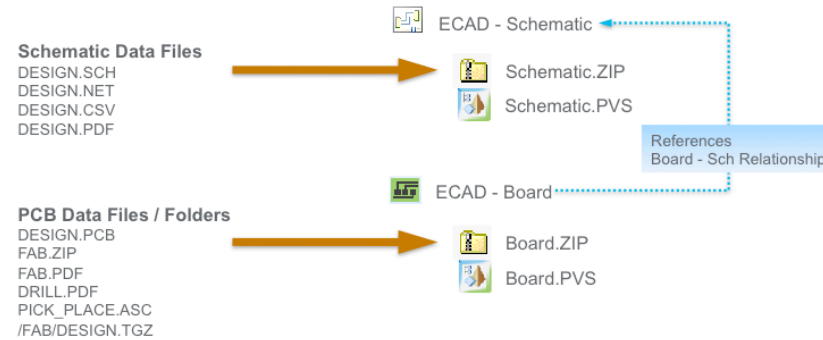
DESIGN.PCB  
FAB.ZIP  
FAB.PDF  
DRILL.PDF  
PICK\_PLACE.ASC



Board.ZIP

Raw data storage is conceptually unchanged; we are zipping two directories of data into separate schematic and board content.

Auto created on checkin process

**Client / Workspace      Commonsense**

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1<sup>st</sup> implementation = simplest

In the simplest implementation with no configuration, we see these relationships created.

The Board references the Schematic

All of this replaces the “shared” drive – but is really the same concept

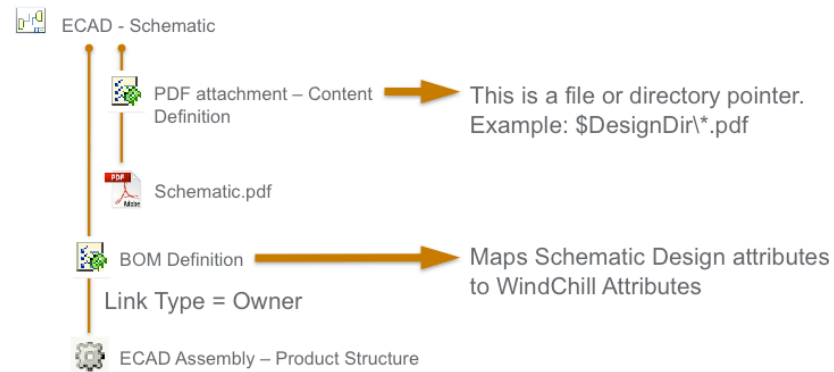
Beyond what we see here; EVERYTHING is a configuration



## Schematic Definitions

We have decided we need a PDF file attached to the schematic – reason irrelevant; this is just an example of a file attachment. Though, it is a realistic / common event.

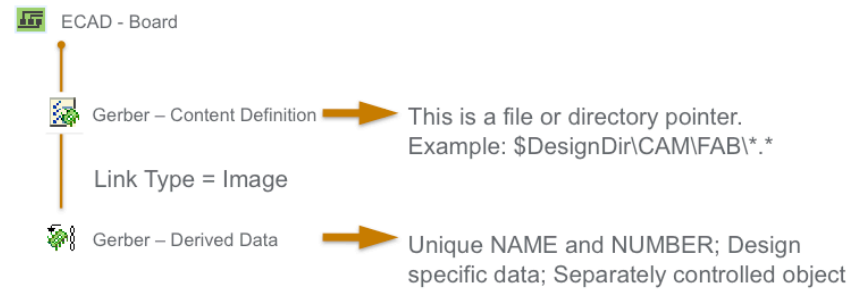
Content definition holds a pointer to the data; it is attached to the schematic. On data import or generate the file is loaded; then it is put in the common space when checkin occurs.



## BOM definitions

Here we have defined the schematic attributes to be used to populate the BOM or Product structure  
Part Number; Description; Reference Designation are minimally required – additional attributes can be configured.

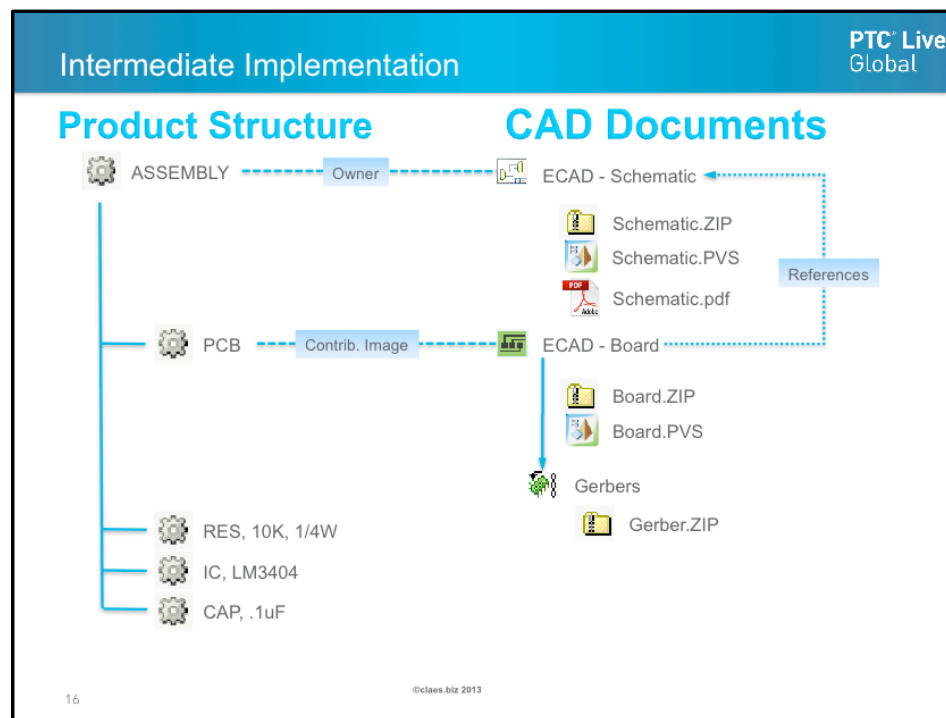
Note that we store these definition objects in a Library for reuse.



OR content definitions

We would like Gerber data created each time on checkin

This form of content definition attached to a derived data object, makes us aware that upon a change to the primary data, the derived data should be updated.



2<sup>nd</sup> implementation; intermediate.

If we added in the configurations just discussed, we would have an intermediate level of configuration and implementation.

Back to our discussion of the double edged sword;

This configuration requires decisions on how off the shelf ECAD parts will be created and maintained in the system. How New parts (NPI) will be done etc

If these processes require changes, redefinition, or even new creation from scratch ....

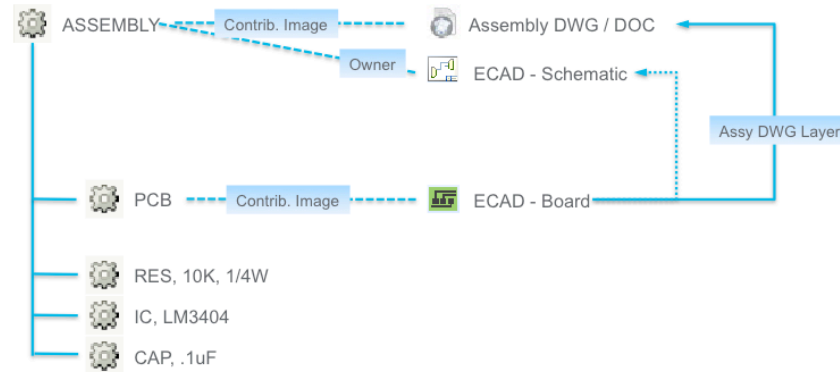
You begin to see why business scoping discussions are important prior to the development of your approach to data storage implementation.

And, also why it is very difficult for me to answer the question, as an experienced implementer, as to “how long will this take?”



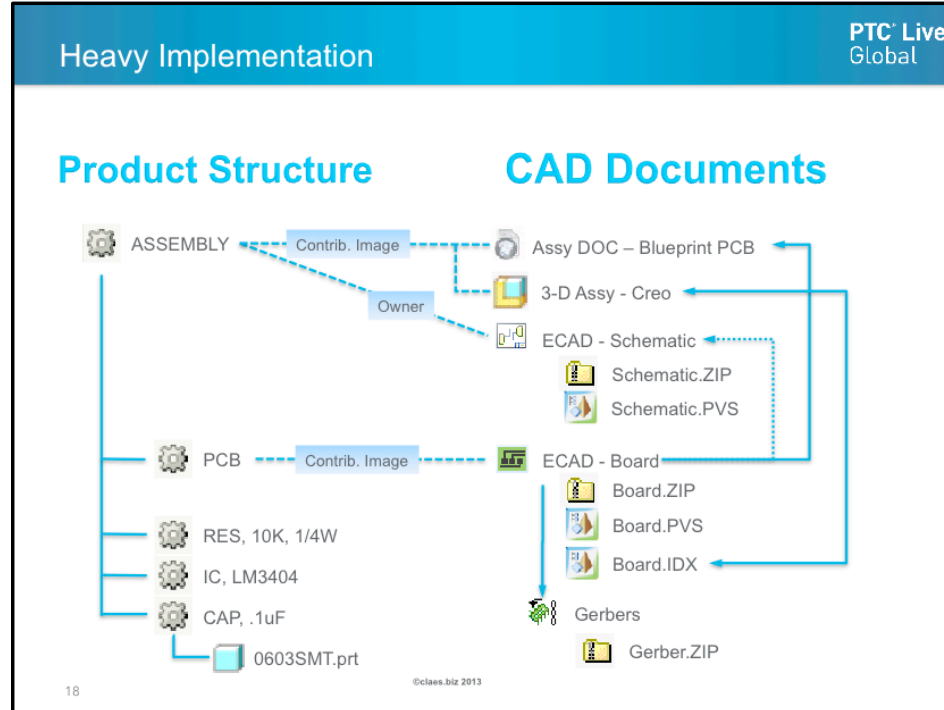
## Product Structure

## CAD Documents



In order to discuss a complete implementation we need to discuss the inherent problem that exists in most all ECAD datasets.

Essentially ECAD software vendors don't structure their datasets in a way that readily accommodates PLM needs. We would like to have a product structure – so we extract that data from the schematic. But – the board dataset holds the assembly data in one of the layers.



### 3<sup>rd</sup> solution

The PTC solution for this is to allow the optional use of Blueprint PCB data files to be the primary cad objects associated with the Assembly WTPart.

The WGM will also manage CAM350 data as a CAD document if needed.

I am also showing here the IDX file and it's association to the 3-D assembly

Parts created; Design uploaded; BOM Managed – ready for checkin

The screenshot shows the Windchill software interface. The top navigation bar includes 'Products > ECAD DEMO > Workspaces'. Below this, there is a 'Primary Active Workspace: preview' dropdown and an 'Object List' section. The 'Object List' is displayed as a table with columns for 'Number', 'Name', 'Actions', and 'Version'. The table contains five rows of data, with the last row highlighted in orange.

Number	Name	Actions	Version
0000013586	SCH, Preview 01	[Icons]	A.2
0000013588	PCB, Preview 01	[Icons]	A.2
0000013589	GBR, Preview 01	[Icons]	A.2
000013587	ASM, Preview 01	[Icons]	A.1
000013588	PCB, Preview 01	[Icons]	A.1

Below the table, it indicates '(0 objects selected)'. The bottom left corner shows '19' and the bottom center shows '©claus.biz 2013'.

Now let's look at some actual design data in the Windchill and WGM environment  
More edges to the sword  
Workspace usage is implemented with the use of the Unified Workgroup Manager

The screenshot displays the Windchill PCB Info Page for an ECAD Board. The page is titled "PCB Info Page" on the right side. The main content area is divided into several sections:

- Visualization and Attributes:** This section contains a thumbnail image of the PCB design and a list of attributes:
  - Number: 000013588
  - Name: PCB, Preview 01
  - Status: Checked in
  - Modified By: Scott Clares
  - Last Modified: 2013-05-15 18:13 CDT
- General:** This section provides detailed design information:
  - Version: A.7
  - Authoring Application: Mentor Graphics PAUS Layout
  - Type: ECAD Board
  - Document Category: ECAD - board
  - Document Subcategory:
  - Checkin Comments:
  - Neutral File: pcbpreview
  - Generic: No
  - Instance: No
  - Missing Dependents: No
  - Incomplete Object: No
  - Description: Template PCB for PAUS PCB design tools kit
  - Board Item: pcbpreview
- Object Specific:** This section lists attributes for the object:
  - MATERIAL:
  - WEIGHT:
  - CLIENT:
  - PROJECT:
- System:** This section provides system-level information:
  - Context: / CAD10 MD Location: / CAD10 MD/PCB VIEW 01
  - Created By: Scott Clares State: In Work - Released - Checked
  - Created On: 2013-05-09 13:05 CDT Life Cycle Template: Rail ©delta.biz 2013

Here we observe the ECAD Board design data details page  
The thumbnail of the visualization is apparent along with the detailed design information

Windchill

Products > ECAD DEMO > Folders > PREVIEW 01

Actions - [Icons] ECAD - Board - 0000013588, A.7

Details | Structure | **Content** | Related Objects | Changes | History | Traceability | Relationship Explorer

Primary Content | Attachments | Representations/Annotations

Primary Content

File Name	Category	File Size	Last Modified	Modifyer
00C0013568.zip	Design Data	115.48 KB	2013-05-15 10:43 PDT	Scott Claes

Attachments

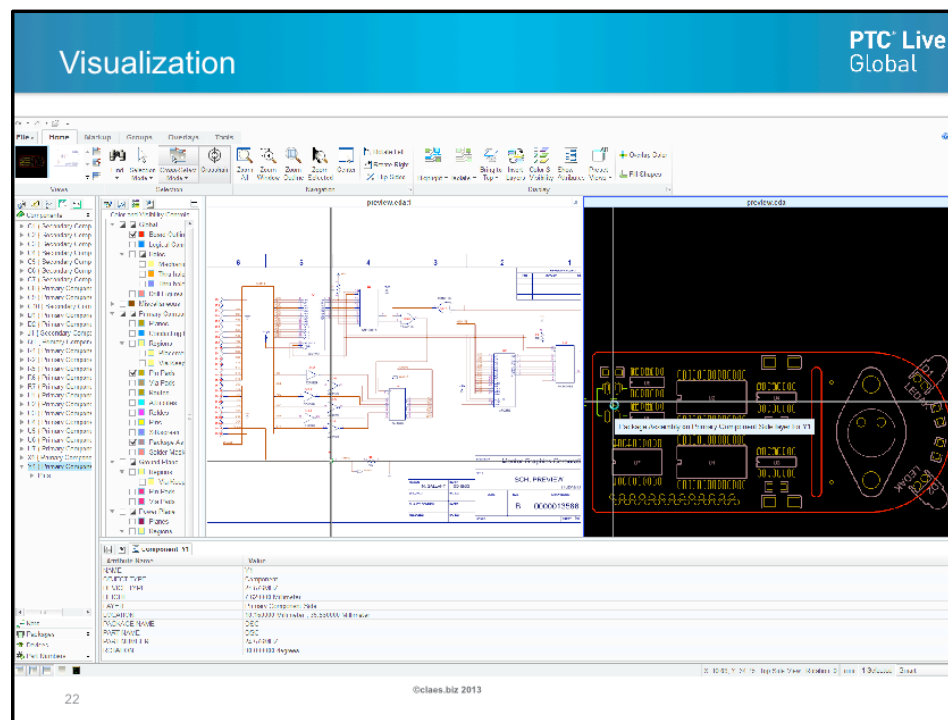
Representations/Annotations

Name	Thumbnail	Description	Details	Locked By	Owner	Last Modified
default	[Thumbnail]	CAD Structure	Default		Scott Claes	2013-05-15 10:43 PDT
EPM only Derives From: ECAD - Board - 00C0013568, A.7						
For designer... Type: annotation Copy Forward: Disabled Autolock: Disabled ©claes.biz 2013						

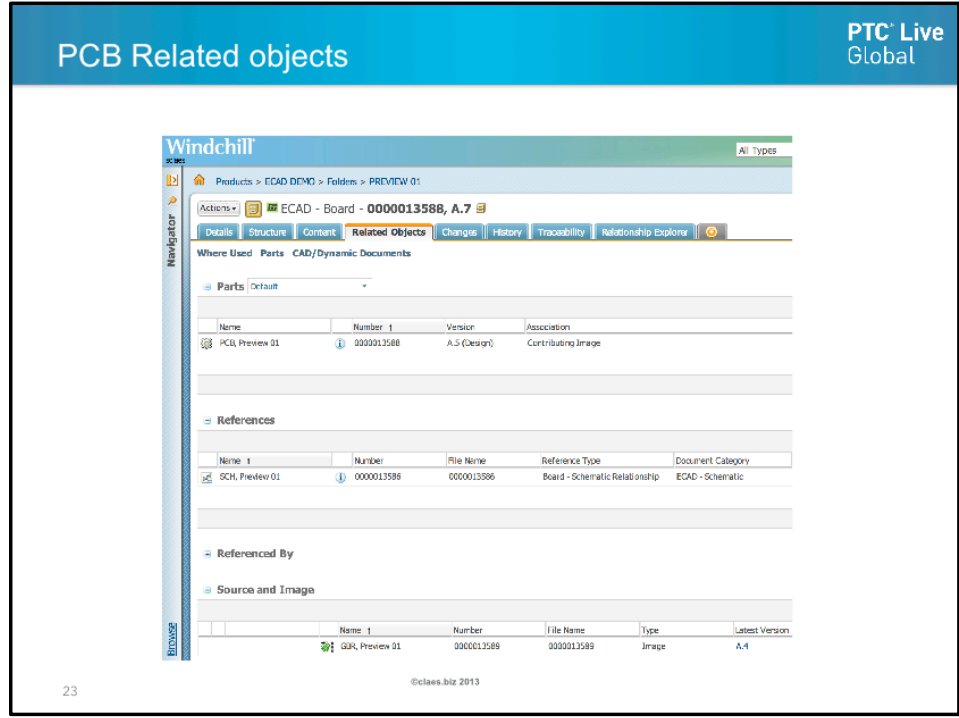
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Viewing the content tab

We see the design data zip file as well as the visualization representation and any annotations or markups associated to it.



The Creo ECAD view is a great visualization tool; assisting in collaboration and comparisons of ECAD data without the consumption of an ECAD tool license.



Note that the related objects to the board are of course the WTPart and the board REFERENCES the Schematic. The board is also the source of the GBR Derived object.

The screenshot displays the Windchill software interface. At the top, the breadcrumb navigation shows 'Products > ECAD DEMO > Folders > PREVIEW 01'. The main content area is titled 'ECAD - Content - 0000013589, A.4'. Below this, there are tabs for 'Details', 'Content', 'Related Objects', 'Changes', 'History', 'Traceability', and 'Relationship Explorer'. The 'Details' tab is active, showing a 'Visualization and Attributes' section with a 3D rendering of a roll of material and a list of attributes: Number: 0000013589, Name: GBR\_Preview\_01, Status: Checked in, Modified By: Scott Claes, and Last Modified: 2013-05-15 18:43 CDT. Below this, there are three expandable sections: 'General', 'Object Specific', and 'System'. The 'General' section is expanded, showing a table of attributes and values. The 'Object Specific' section is collapsed, showing 'MATERIAL:', 'WEIGHT:', 'CLIENT:', and 'PROJECT:'. The 'System' section is also collapsed, showing 'Context: ECAD DEMO', 'Location: /ECAD DEMO/PREVIEW 01', 'Created By: Scott Claes', 'State: In Work', 'Released', and 'Cancelled', and 'Created On: 2013-05-09 13:05 CDT', 'Life Cycle Template: Basic', and '©daas.biz 2013'. A vertical blue bar on the right side of the interface contains the text 'Derived Content'.

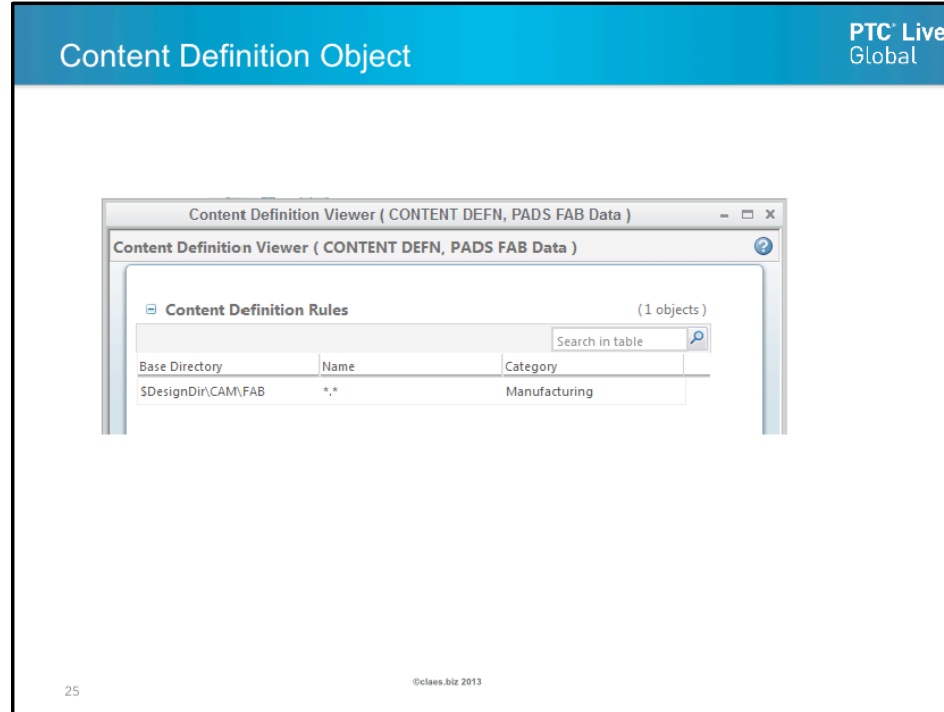
General	
Version:	A.4
Authoring Application:	Windchill System
Type:	ECAD Derived
Document Category:	ECAD - Content
Document Subcategory:	
Checkin Comments:	
Generic:	No
Instance:	No
Missing Dependents:	No
Incomplete Object:	No
Description:	Derived Gerber data from PCU

Object Specific	
MATERIAL:	
WEIGHT:	
CLIENT:	
PROJECT:	

System	
Context:	ECAD DEMO
Location:	/ECAD DEMO/PREVIEW 01
Created By:	Scott Claes
State:	In Work Released Cancelled
Created On:	2013-05-09 13:05 CDT
Life Cycle Template:	Basic

Looking at the GBR derived object, we see the details of it's information





Here we see the actual content definition that was used to attach these files to the Derived Gerber object

The screenshot displays the Windchill user interface for a specific content item. The breadcrumb path is 'Products > ECAD DEMO > Folders > PREVIEW 01'. The content item is identified as 'ECAD - Content - 0000013589, A.4'. The 'Content' tab is active, showing options for 'Primary Content', 'Attachments', and 'Representations/Annotations'. The 'Attachments' section contains a table with the following data:

File Name	Status	Download Automatically	Category	File Size
art01.gph	Current	Yes	Manufacturing	59.64 KB
art01.rep	Current	Yes	Manufacturing	0.75 KB
preview_gln.zip	Current	Yes	Manufacturing	1.17 KB

The 'Representations/Annotations' section shows a table with columns for Name, Thumbnail, Description, Details, Locked By, and Owner. One entry is visible with the description 'CAD Structure' and a 'Default' dropdown menu. At the bottom, it indicates '( 0 objects selected )'. The footer of the interface shows '©clae.biz 2013'.

As well as the attached contents

Windchill

Products > ECAD DEMO > Folders > PREVIEW 01

Actions | ECAD Schematic: 0000013586, A.12

Details | Structure | Content | Related Objects | Changes | History | Traceability | Relationship Explorer

Visualization and Attributes | More Attributes



**Visualization and Attributes**

Number: 0000013586  
Name: SCH, Preview 01  
Status: Checked in  
Modified By: Scott Claes  
Last Modified: 2013-05-15 18:27:01

**General**

Version:	A.12	Generic:	No
Authoring Application:	Mentor Graphics PADS Logic	Instance:	No
Type:	ECAD Schematic	Missing Dependents:	No
Document Category:	ECAD - Schematic	Incomplete Object:	No
Document Subcategory:		Description:	Template, Schematic for PADS Log
Checkin Comments:	permissions check in design ready for layout	Neutral File:	preview.xml
Schematic Item:	preview.sch		

**Object Specific**

MATERIAL:  
WEIGHT:  
CLIENT:  
PROJECT:

**System**

Context:	11.A11131.M01	Location:	11.A11131.M03P01.V11.W.01
Created By:	Scott Claes	State:	Released, Cancelled
Created On:	2013-05-09 13:05:01	Life Cycle Template:	11.ecad

Search | Refresh

All Types

Navigation

Schematic Info Page

Next

Looking at the schematic info page

We see the visualization thumbnail and associated details

Windchill

Products > ECAD DEMO > Folders > PREVIEW.01

Actions | FCAD Schematic: 0000013586, A.12

Details | Structure | **Content** | Related Objects | Changes | History | Traceability | Relationship Explorer

Primary Content | Attachments | Representations/Annotations

Primary Content

File Name	Category	File Size	Last Modified	Modifier
0000013586.zip	Design Data	11.1 KB	2013-05-13 10:59 AM	Scott Coles

Attachments

File Name	Status	Download Automatically	Category	File Size	Last Modified
orenew.ppt	Current	Yes	Drawing	62.47 KB	2013-05-13

Representations/Annotations

Name	Thumbnail	Description	Default	Linked By	Owner	Last Modified
Default		ETM only Derived From: ECAD Schematic: 0000013586...	Default		Scott Coles	2013-05-13

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And again under content  
The zipped design data  
The PDF file we specified in the PDF content definition  
And the visualization file

Windchill

Products > ECAD (X) MO > Editors > PVIEW (1)

Actions | P (A) Schematic 0000013586, A.12

Details | Structure | Context | **Related Objects** | Changes | History | Traceability | Relationship Explorer

Where Used Parts | CAD/Dynamic Documents

Where Used Default (1)

Name	Number	File Name	Dependency Type	Version	State	Object Type
SCH, Preview 01	0000013586	0000013586	Initially Selected	A.12	In Work	PCAD Schematic

(0 objects selected.)

Parts Default

Name	Number	Version	Association
ASM, Preview 01	0000013587	A.8 (Design)	Owner
PCB, Preview 01	0000013588	A.5 (Design)	Usage

References

Name	Number	File Name	Reference Type	Document Category	Latest Version
BOM, Attrb Map, PC...	BOM_MSP_01	BOM_MSP_01	BOM Definition	PCAD - BOM Attribute Map	A.1
CONTENT REF, SCH...	CONTENT_002	CONTENT_002	Content Definition	PCAD - Content Definition	A.1

Referenced By

Name	Number	File Name	Referencing Type	Version
PCB, Preview 01	0000013588	0000013588	boards - Schematic Relationship	A.7

Schematic Related Objects

Objects related to the schematic are the parts in the BOM  
 The definition items  
 and the Schematic is REFERENCED BY the PCB.

Windchill

Products > ECAD DEMO > Folders > PRTMFG.01

ECAD Schematic: 0000013586, A.12

Details | Structure | Content | Related Objects | Changes | **History** | Traceability | Relationship Explorer

Version History | Timeline

Version History General

Version	Last Modified	File Name	Size	State	Comments	Mentioned By
A.12	2013-05-15 18:27 CDT	0000013586	11.84 KB	In Work	previews/scr file checked in	Scott Claes
A.11	2013-05-15 18:24 CDT	0000013586	52.74 KB	In Work	previews/scr file checked in	Scott Claes
A.10	2013-05-15 18:19 CDT	0000013586	51.18 KB	In Work	previews/scr file checked in	Scott Claes
A.9	2013-05-15 18:12 CDT	0000013586	49.57 KB	In Work	previews/scr file checked in	Scott Claes
A.8	2013-05-15 18:01 CDT	0000013586	103.12 KB	In Work	previews/scr file checked in	Scott Claes
A.7	2013-05-15 17:52 CDT	0000013586	49.22 KB	In Work	previews/scr file checked in	Scott Claes
A.6	2013-05-15 17:36 CDT	0000013586	49.22 KB	In Work	previews/scr file checked in	Scott Claes
A.5	2013-05-09 18:56 CDT	0000013586	46.05 KB	In Work	previews/scr file checked in	Scott Claes
A.4	2013-05-09 18:28 CDT	0000013586	63.07 KB	In Work		Scott Claes
A.3	2013-05-09 17:45 CDT	0000013586	63.07 KB	In Work	Final check in with BOM	Scott Claes
A.2	2013-05-09 16:18 CDT	0000013586	63.07 KB	In Work		Scott Claes
A.1	2013-05-09 15:05 CDT	0000013586		In Work		Scott Claes

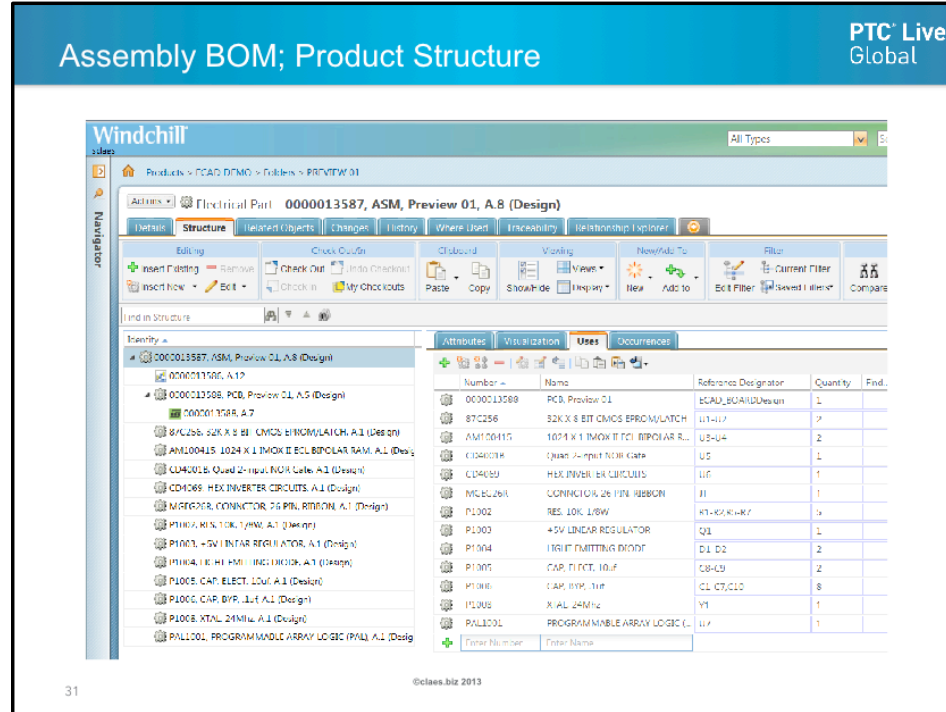
(0 objects selected)

Timeline History

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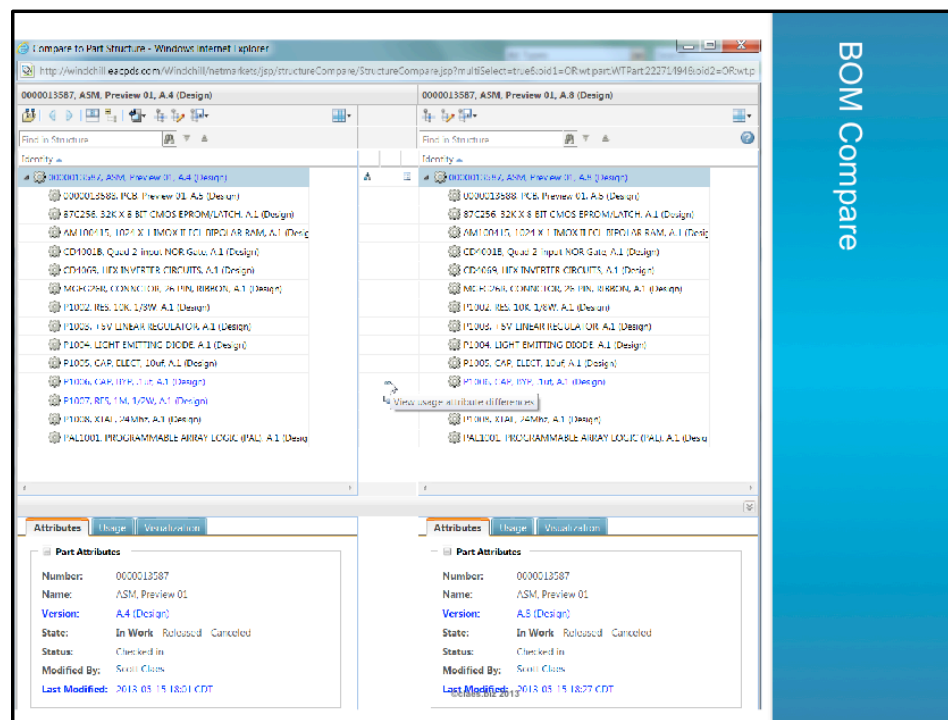
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While the history tab obviously provides a history of creation of versions and iterations,



Finally  
 Choosing to view the information page of the Assembly  
 And examining the structure;  
 We see the product structure and the BILL of MATERIALS  
 There are multiple views available

If we choose the compare button all the way to the right ...



Where we see different icons and line coloration that depicts changes that have occurred.



**Usage Attribute Differences**

0000013587, ASM, Preview 01, A.4 (Design)	0000013587, ASM, Preview 01, A.8 (Design)
P1006, CAP, BYP, .luf, A.1 (Design)	P1006, CAP, BYP, .luf, A.1 (Design)
<b>Attributes</b>	<b>Attributes</b>
<b>Quantity:</b> 7	<b>Quantity:</b> 8
<b>Unit:</b> each	<b>Unit:</b> each
<b>Line Number:</b>	<b>Line Number:</b>
<b>Find Number:</b>	<b>Find Number:</b>
<b>Trace Code:</b> Untraced	<b>Trace Code:</b> Untraced
<b>Reference Designator:</b> C1-C7	<b>Reference Designator:</b> C1-C7,C10

Close

I would also point out that there are tools in Creo View for performing more detailed difference analysis

## Hook Implementation

- The hook launches a stand alone script/bat/ exe
- Steps:
  - Create and test the standalone script
  - Create Hook ECAD Definition
  - Link the script to the ECAD Definition
  - Attach the Definition to the PCB

Make sure the example BAT file is open in TXT editor to show  
Also have WWGM PDF open on desktop to show the examples in the documentation.

A hook launches a stand alone script  
Runs in an environment that runs on the ECAD client

## fab\_zip.bat

```
@echo off
echo Starting Pre Update Hook execution
REM Select a case of the hook: use or skip result of Built-In action
if Not DEFINED BUILT_IN_EXECUTION GOTO ON_ERROR_EXIT
if %BUILT_IN_EXECUTION%==BuiltInExecutionResult:False GOTO SKIP_BuiltIn
if %BUILT_IN_EXECUTION%==BuiltInExecutionResult:True GOTO USE_BuiltIn
GOTO ON_ERROR_EXIT
:USE_BuiltIn
echo BUILT IN IS INCORRECT FLOW IN THIS PREUPDATE ACTION
GOTO ONEXIT
:SKIP_BuiltIn
echo SKIP BUILT IN: Create Fabrication ZIP file from all files in %DESIGN_DIR%\CAM\FAB
echo Removing any existing zip files
if EXIST "%DESIGN_DIR%\CAM\FAB\*.zip" del "%DESIGN_DIR%\CAM\FAB\*.zip"
if EXIST "%DESIGN_DIR%\CAM\FAB\*.zip" GOTO ON_ERROR_EXIT
"%ZIP_EXEC%" "%DESIGN_DIR%\CAM\FAB\%DESIGN_ITEM%_FAB.zip" "%DESIGN_DIR%\CAM\FAB\*"
GOTO ONEXIT
:ONEXIT
echo Pre Update Hook finished successfully.
exit /B 0
:ON_ERROR_EXIT
echo Error occurred during Pre Update Hook execution.
exit /B 1
```

There are examples of script .bat files in the WWGM PDF documentation

New CAD Document

Context: ECAD DEMO

Authoring Application: Windchill System

Category: ECAD - Hook Definition

Type: ECAD Definition

Template Name: ECAD Hook for Pre Update

Attributes

Number: HOOK\_001

Name: HOOK\_FAB\_zip\_file\_creation

Revision: A

Description: Hook to execute Fab ZIP file creation

Location:  Autoselect Folder //ECAD DEMO/  Select Folder /ECAD DEMO/PREVIEW CL

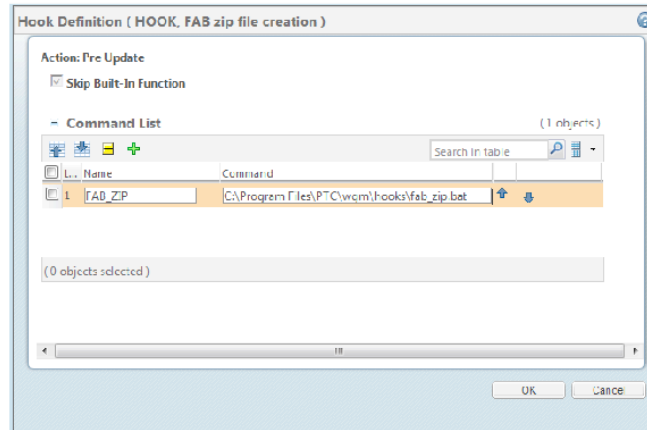
Create and Associate Part

OK Cancel

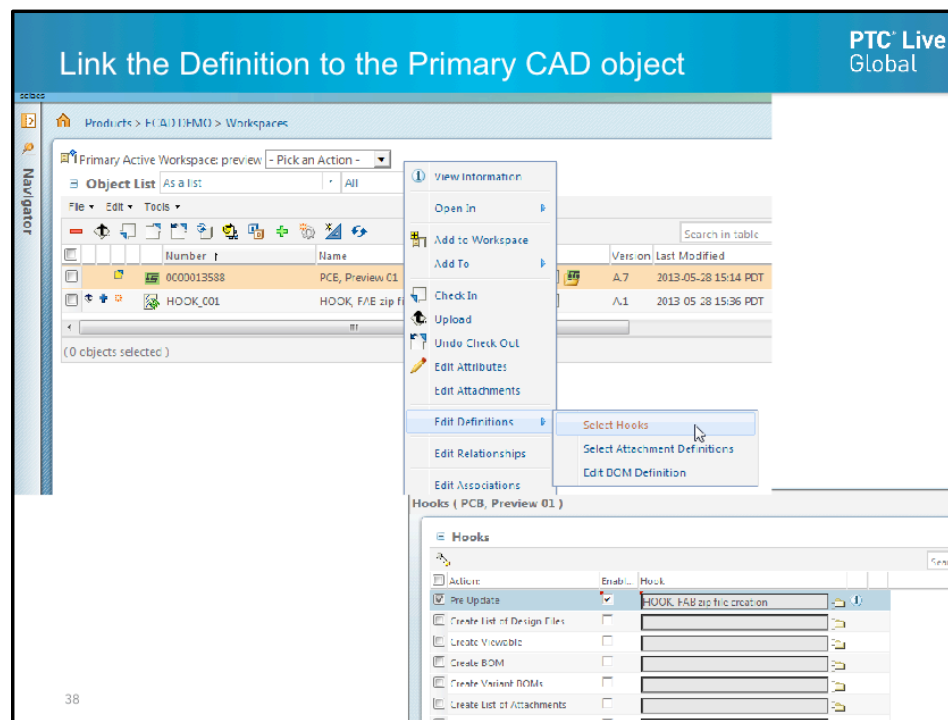
ECAD - BOM Attributes Mapping  
ECAD - BOM Filter Definition  
ECAD - Content  
ECAD - Content Definition  
ECAD - Drawing  
ECAD - MCAD Exchange Data  
ECAD - Packaged View  
ECAD Hook for Create BOM  
ECAD Hook for Create List of Attachments  
ECAD Hook for Create List of Design Files  
ECAD Hook for Create Variant BOMs  
ECAD Hook for Create Viewable  
ECAD Hook for Get Design Directory  
ECAD Hook for Get Design Item List  
ECAD Hook for Get List of Neutral Format Items  
**ECAD Hook for Pre Update**  
ECAD Hook for Retrieve Attributes from Design  
ECAD Hook for Validate Design

HOOK\_001

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Store the definition, as all definitions, in a generic library for reuse by any dataset.  
Check it in.



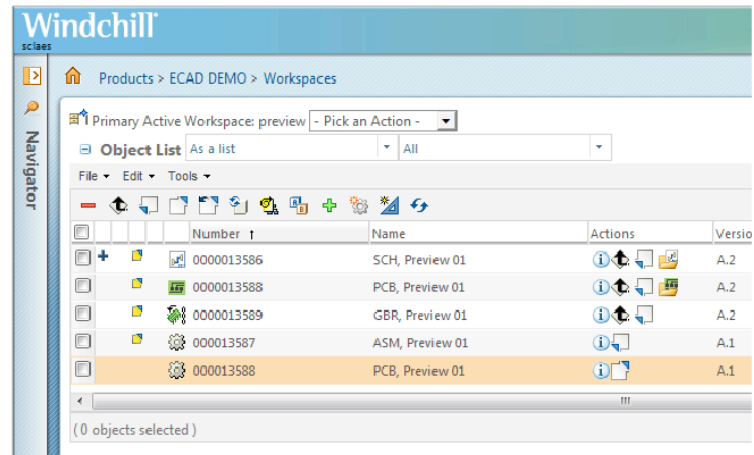
Edit Definitions; Select Hooks on the PCB CAD document.  
This is because the data is associated with the PCB.

The screenshot shows the Windchill interface for a product named 'ECAD DEMO' with a folder 'PREVIEW 01'. The content ID is '000013589, A.4'. The 'Attachments' section contains a table with the following data:

File Name	Status	Download Automatically	Category	File Size
ch101.pru	Current	Yes	Manufacturing	59.91 KB
ch101.rep	Current	Yes	Manufacturing	0.75 KB
preview_gbr.zip	Current	Yes	Manufacturing	1.47 KB

The 'preview\_gbr.zip' file is circled in red. Below the attachments table, there is a 'Representations/Annotations' section with a table showing 'CAD Structure' as the description and 'Default' as the details.

As well as the attached contents




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What did we just see?

A complete dataset as shown here, in the workspace created, defined and implemented.  
Revise and modify independently





ECAD Library Control  
ECAD/MCAD Collaboration  
BOM Management (Prod Structure)  
Collaboration ECAD Compare  
WTPart implementation  
SCH & PCB Control with WGM

That covers our data implementation discussion

In general I would like to make a few suggestions based on my experience in installing and configuring ECAD data in PDMLink.

Generally there are two “ top of the pyramid requirements; Product Structure driven from Bill of Materials – Schematic extraction, and ECAD/MCAD collaboration.

Start with the simple parts that provide value to your business; then add on the more complex after designers and engineers are familiar and comfortable with the processes newly implemented.

- Don't expect the tools purchase, install, and configuration, to change your processes

Tools don't change your processes

# PTC Live Global; June 10, 2013

## ECAD Data Model in Windchill

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**CLAES DOT BIZ**  
integrating ECAD into PLM

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