

PTC® Live Global

CUST103 - PTC Creo Parametric: ECAD-MCAD Collaboration: Overview of the IDX Process

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OBJECTIVES

PTC® Live
Global

Below are the primary objectives for this session:

- Introduce the IDX exchange method (compared to IDF)
- Identify a clear procedure for exchanging & synchronizing PCB design data between ECAD-MCAD applications
- Examine PTC Creo View ECAD – Validate & Compare

This is your chance to escape if these topics are not of interest



- Introductions
- Overview of IDX
- BlackBerry Environment
- PTC Creo View ECAD Validate & Compare
- Collaboration Process
- Best Practices & Looking Ahead

**Alex Gioultouridis**

- 5th trip to PTC Live, 1st time presenting
- From Toronto, Canada – where ‘Windchill’ has a whole other meaning
- Education & Experience
 - CNC Machinist, Mech Eng Technologist, Bachelor of Applied Science
 - Worked with PTC products for 20+ years (beginning with Pro/Engineer 9.0)
- Been with BlackBerry for 5-years
 - Started with management/support of Pro/Engineer Wildfire data for Mechanical Engineering
 - Expanded role to managing/supporting the BlackBerry Windchill & Creo product environment
- Prior to BlackBerry worked with Rand Technologies (PTC VAR) for 11-years with experience in:
 - Support
 - Consulting
 - Training & Courseware Development
 - Sales



WHO WE ARE

BlackBerry is for serious business people and the most demanding businesses. BlackBerry offers **professional mobility solutions** driven by **superior productivity**, **ultimate security** and **effective communications**.

Customers Include:

- All G7 governments
- 16 of the G20 governments
- 10 out of 10 of the largest global banks and global law firms
- top five largest managed healthcare

**BlackBerry at a Glance**

- **Corporate Overview**
 - Corporate headquarters are in Waterloo, Ontario, Canada
 - 7000+ employees
 - ~\$3.3B in cash, cash flow even, profitability expected by FY 2016
- **More than a Device organization**
 - BlackBerry Smartphones
 - 4 new devices introduced in the past 6-months
 - Secure
 - Support of native Android Apps
 - Enterprise Solutions
 - Mobile Device Management with BES 12 – Support of Android, iOS, Microsoft
 - Enterprise Security with BES 12
 - Security for Android and beyond...
 - BBM – 91+ Million Users (and growing)
 - Chat, Voice, Video Chat, Meetings
 - Internet of Things
 - Device Software, Cloud Services, Data Interfaces

**BlackBerry
Protect**

"QNX provided us with the right combination of stability, real-time performance and functionality. QNX lets us develop, maintain, and upgrade customer systems quickly and easily."

CATERPILLAR®

BlackBerry at a Glance



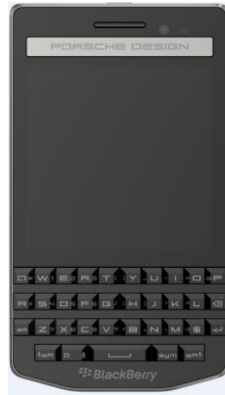
BlackBerry Passport

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BlackBerry Classic

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BlackBerry P'9983

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BlackBerry Leap

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BlackBerry at a Glance

FINANCIAL POST ARTICLE:

[BlackBerry Ltd teases slider phone with curved screen at Mobile World Congress](#)



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What is IDX?

- IDX (InterDomain Exchange or Incremental Design Exchange) is a new XML based file type method for communicating PCB design data between ECAD-MCAD applications
- IDX is a ProSTEP iViP standard (www.prostep.org)
- Alternative to the IDF 3.0 (*.emn, *.emp) PCB design exchange process.
- The IDX format contains and communicates incremental PCB design changes between Mechanical and Electrical CAD applications.
- The IDX format is also capable of communicating an entire PCB design between CAD applications



IDX File Types

1. Baseline IDX:

- Contain only the Board Outline, ECAD Areas, Holes, and Component Placements.
- Typically made at the beginning of the PCB Design Process, or at a business defined milestone.
- Created by both MCAD and ECAD applications.

2. Incremental IDX:

- Contain iterative changes to the PCB assembly (including Modifications, Additions, and Deletions to the PCB Design).
- Created as PCB design matures (iterative process)
- Created by both MCAD and ECAD applications.

- The IDX file type classification is listed in the header/body of the IDX file.



EDA File Type

- EDA is the PTC Creo View ECAD file extension used to describe the binary data format in which we store PCB Layout and Schematic design data
- Alternative file type used in the process of comparing incremental design changes between two PCB assembly designs
 - A 2D bi-level vector image description format (aka 2D geometry of PCB design)
 - An Incremental IDX is created as a result of the comparison
 - EDA files are created and consumed by Mechanical Designers
 - Created in PTC Creo Parametric 2.0 (**File** → **Save as Copy** → *.eda)
 - Stored locally on the workstation or within Windchill

When do we use EDA versus the other IDX incremental process?

- Primarily used if MCAD is out of sync with ECAD design, and/or loses track of MCAD related design changes.

IDX Feature Types & Actions

- **IDX Feature Types** to exchange between MCAD (PTC Creo) and ECAD (Zuken) applications:
 - PCB Board Outline
 - Component Placements
 - Drill Holes
 - ECAD Areas (Keepin, Keepout, etc.)

- **IDX Action Types:**
 - Add
 - Delete
 - Modify



- ✓ Introductions
- ✓ Overview of IDX
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IDX Process - Software Environment

MCAD APPLICATIONS

- PTC Creo Parametric 2.0
 - MCAD design tool
- PTC Creo Parametric – ECAD Collaboration
 - Floating Module
 - IDX Process “Hub”
- PTC Creo View 2.0 - ECAD Validate
 - Generates .IDX Data
- PTC Creo View 2.0 – ECAD Compare
 - Compare IDX or EDA data
- PTC Windchill 10.1
 - MCAD PDM/PLM System

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IDX Process - Software Environment

ECAD APPLICATIONS

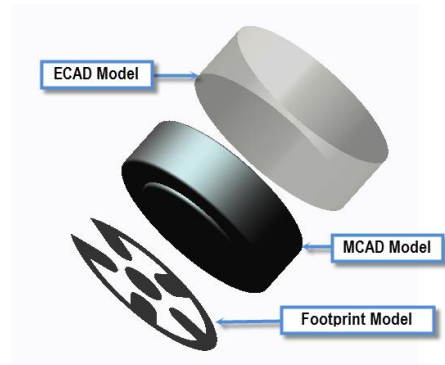
- Zuken CR-5000
 - ECAD design tool
- Zuken Interchanger for Creo (Zi4C)
 - Floating Module
 - IDX Process “Hub”
 - Generates .IDX Data
- DS/2
 - ECAD PDM/PLM System

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BlackBerry Component Library

PTC Windchill Library Context

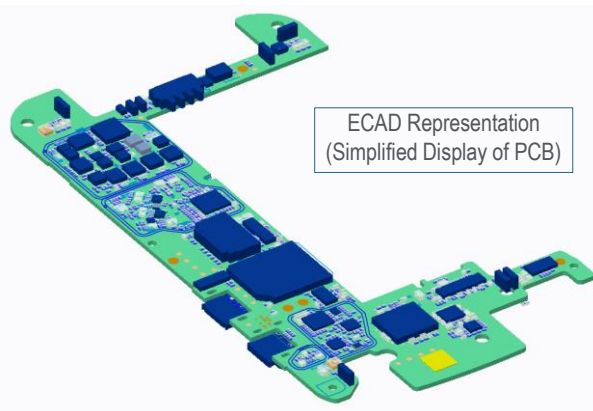
- Each PCB component is a PTC Creo Parametric assembly
 - PTC Windchill Part (metadata – ex. classification)
 - PTC Creo Assembly (Component)
 - PTC Creo Part - ECAD Outline (primitive shape)
 - PTC Creo Part - ECAD Footprint
 - PTC Creo Part - MCAD Representation



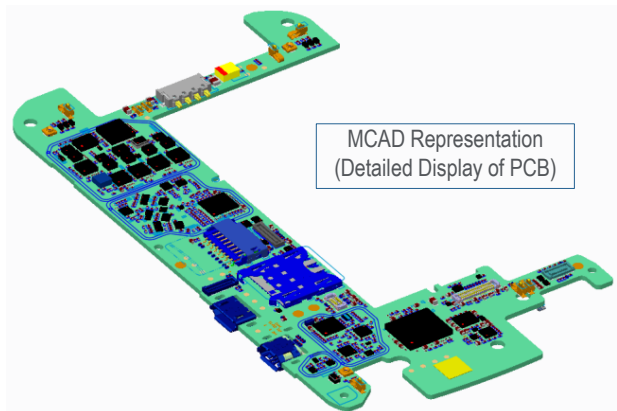
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BlackBerry Component Library

PTC Windchill Library Context



ECAD Representation
(Simplified Display of PCB)



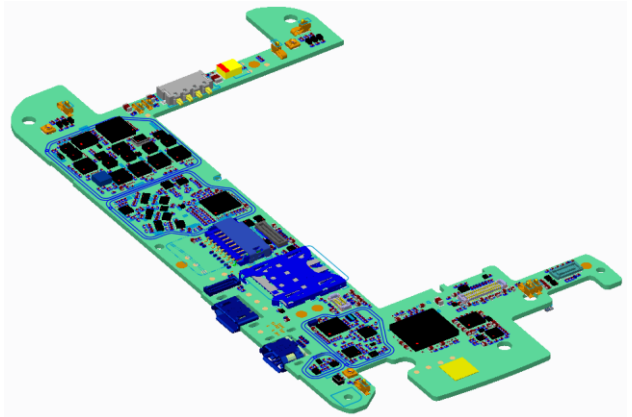
MCAD Representation
(Detailed Display of PCB)

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BlackBerry Component Library

PTC Windchill Library Context

- Pros:
 - Display all of the relevant detailed information
 - Use of Layers to control visibility (better use of space)
- Cons:
 - Many CAD models for one component
 - Additional training to create awareness



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Current Challenges with IDF (EMN/EMP data)

- Differentiating between a Hole and Pin feature
- Negative Cutouts on the Board
- No visual or log to illustrate incremental changes
- Multiple uses-methods of exchanging data
- Support of different ECAD Areas (many limitations – process and software)



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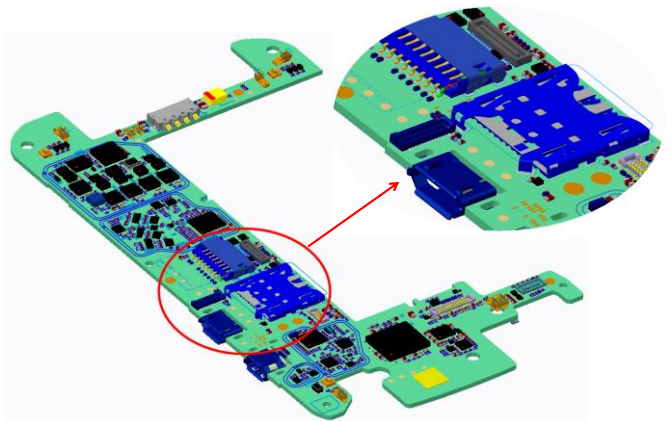
Current Challenges with IDF (EMN/EMP data)

- **All or nothing exchange**
 - Destructive import into ECAD (all changes in ECAD are gone)
 - Destructive import into MCAD (full PCB is rebuilt from IDF)
- **Taxing on the CAD system and Workstation**
 - Component Library parts contain - ECAD, MCAD, and PAD geometry
- **Time consuming (especially when making multiple exchanges in a day)**
 - Time to import EMN/EMP with 500+ Components could take 15+ minutes
 - Time to import IDX with 10-15 changes takes seconds!!!
- **No design history managed in the IDF file (lacks log of what's changed)**



Benefits to using IDX

- **Performance Improvements**
 - Save time by only loading incremental updates into a fully loaded PCB
 - Visual comprehension of each incremental change



Benefits to using IDX

- **Promotes concurrent design**
 - Potential for PCB designer to begin sooner
- **Increased design collaboration between MCAD & ECAD**
 - Ability to propose design changes through the IDX without actually changing the design (see what I mean)
- **Design History Contained in IDX**
 - Visible in PTC Creo View ECAD Validate
- **Increased number of ECAD Area feature usage**
- **Support of parametric part design functionality**
 - * In process of developing methodology



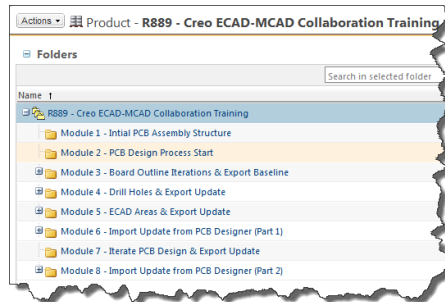
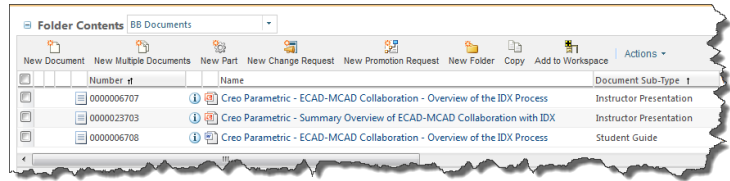
Training Roll-Out Strategy

- **Pick someone that is open to change**
- **Pick someone that is experiencing the current challenges**
- **Pick only one Mechanical and one PCB designer at a time**
 - 'Buddy System' to support exchange
 - Primes on a project (develop a champion)
- **Get support from executive management to promote change and process improvements**
 - Define this as a 'process improvement initiative' within the organization
- **Begin with pilot PCB design projects**
 - Become familiar with the new application
 - Tweak the process to suit your needs



Training & Development

- Instructor-led Training Presentation
- Student Guide
- Self-Paced Exercises
 - Managed in PTC Windchill (download locally)
 - Read Only access (reusable content)
 - Modular (start from any module)
 - Student data managed in a Workspace



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AGENDA

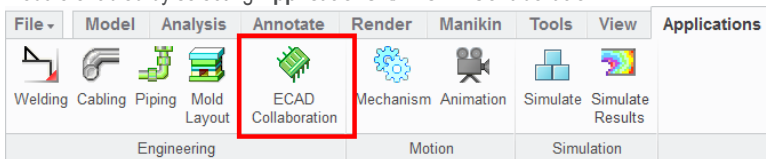
- ✓ Introductions
- ✓ Overview of IDX
- ✓ BlackBerry Environment
- PTC Creo View ECAD Validate & Compare
- Collaboration Process
- Best Practices & Looking Ahead



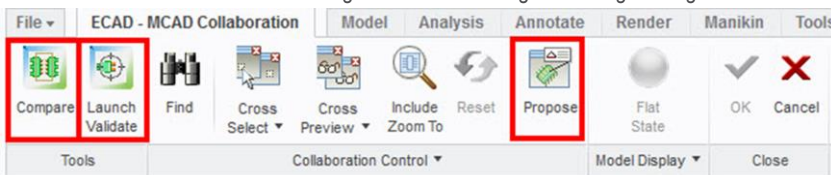
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PTC Creo Parametric – ECAD Collaboration

- Bridge between MCAD & ECAD PCB design changes (.idx file type)
 - Pre-Installed with PTC Creo Parametric
 - License enabled through Floating Modules (File → Options → Licensing)
 - Module enabled by selecting Applications → ECAD Collaboration



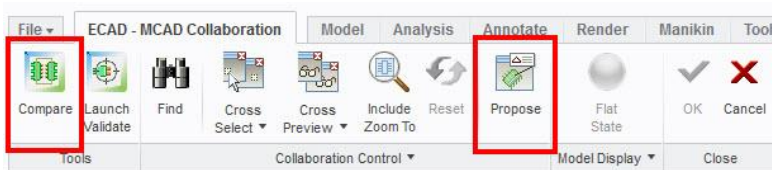
- Dedicated ribbon interface for reviewing and communicating PCB design changes



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PTC Creo Parametric – ECAD Collaboration

- Two (2) methods to export incremental design changes through IDX incremental files
 1. Compare
 2. Propose



- Compare
 - Creates an Incremental IDX by comparing two PCB assembly designs ('ASM to ASM' OR 'ASM to EDA' file comparison)
- Propose
 - Creates an Incremental IDX by manually selecting PCB design changes (Ex. Board Outline, Components, Drill Holes, and ECAD Areas)

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PTC Creo Parametric – ECAD Collaboration

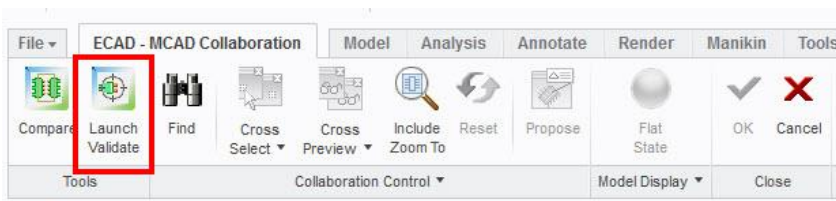
- Pros & Cons of using Propose vs. Compare for exchanging Incremental IDX data

	PROPOSE	COMPARE
Pros	<ul style="list-style-type: none"> • Quick Process <ul style="list-style-type: none"> • Easy process to follow • Less clicks than Compare 	<ul style="list-style-type: none"> • More Precise <ul style="list-style-type: none"> • No chance of missing a change • Can create Incremental IDX from Baselines (for comparing builds) • Sync IDX Rejections back to Creo
Cons	<ul style="list-style-type: none"> • Must remember what features were changed (Add, Delete, Modify) 	<ul style="list-style-type: none"> • Must Save EDA after every Compare • Must Be Synced With PCB Designer before Compare

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PTC Creo View ECAD Validate

- Application for reviewing, communicating, & executing incremental design changes of the PCB
- Launched from within PTC Creo Parametric – ECAD Collaboration ribbon
- Starting point for importing Incremental IDX files from the ECAD application
 - Import IDX – Preview PCB design changes listed in the IDX file
 - Export IDX – Relay PCB design changes through the IDX format

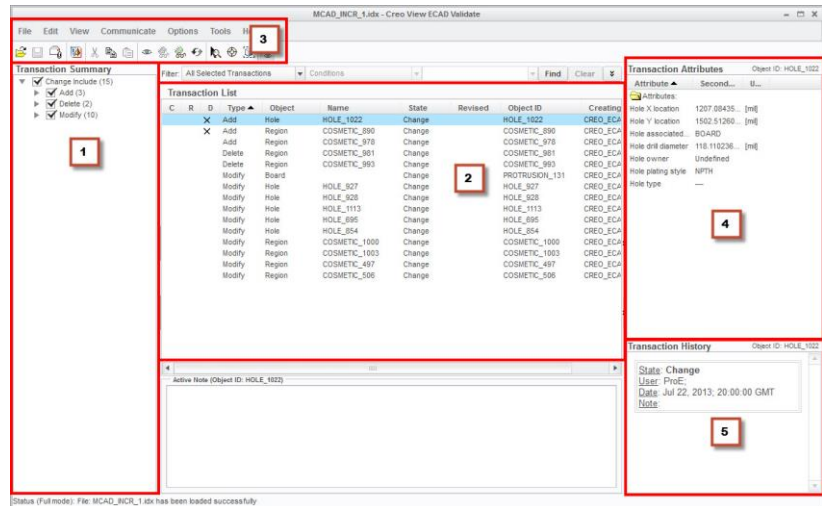


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PTC Creo View ECAD Validate

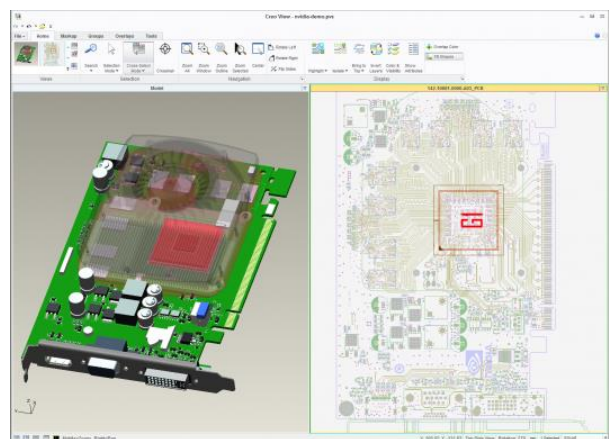
User Interface

1. Transaction Summary
 - i. Add
 - ii. Modify
 - iii. Delete
2. Transaction List
3. Toolbar
4. Transaction Attributes
5. Transaction History



PTC Creo View ECAD Compare

- Automates the PCB design comparison
- Separate interface from MCAD & ECAD Applications
- Benefits:
 - Interacts with PTC Creo View ECAD & Creo Parametric applications
 - Support of additional transaction functions



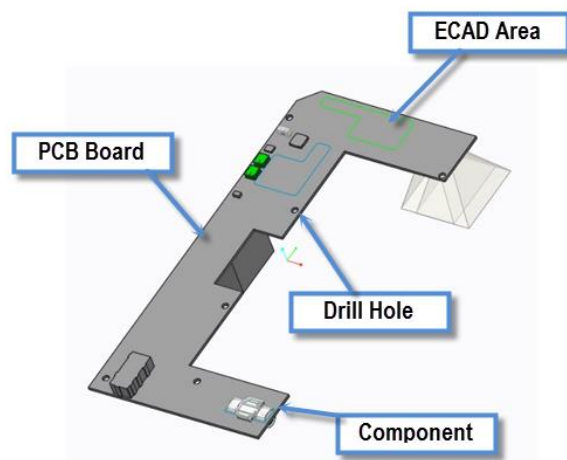
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Collaboration Process

Define PCB Feature Types to Manage

- Four (4) Primary Feature Types in PCB
 1. PCB Board Outline
 2. Drill Holes
 3. ECAD Areas
 4. Component Placement



Define PCB Design Roles within the organization

- **Mechanical Engineering is responsible for:**
 - PCB Board Outline
 - Drill Holes
 - ECAD Areas (shared)
- **Electrical Engineering is responsible for:**
 - Component Placement
 - ECAD Areas (shared)

Feature Type	Mechanical Engineer	Electrical Engineer	Description
Board Outline	X	/	MCAD Owned – The Mechanical Engineer has sole ownership of the PCB Board Outline
Drill Holes	X	/	MCAD Owned – The Mechanical Engineer has sole ownership of the Drill Holes
ECAD Areas	X	X	Shared – Ownership of each ECAD Area Type will be displayed in the ECAD Area section
Component Placements	/	X	ECAD Owned – The Electrical Engineer has sole ownership of the Component Placements

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Define Ownership of Shared ECAD Area Design Features

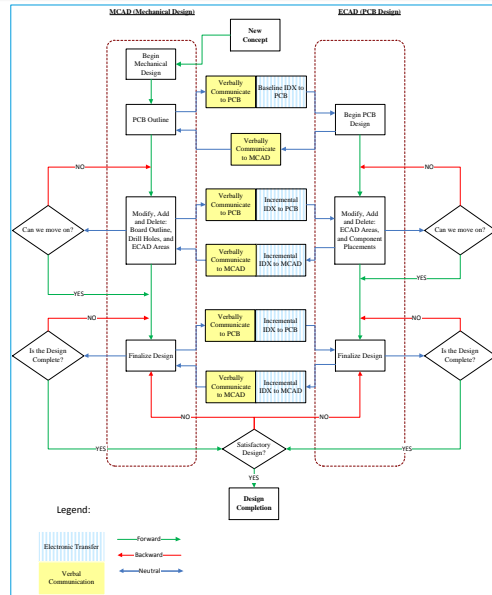
ECAD Area Type	MCAD Owned	ECAD Owned	Description
Place Keepin (Height Limit)	X	X	Shield Can Development
Place Keepout	X	X*	Where Components and Electrical features should not go
Place Region	N/A	N/A	Not Supported by Zuken
Route Keepin	/	X	Used by PCB
Route Keepout	/	X	Used by PCB
Via Keepout	/	X	Used by PCB

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Define Design Process Flow with IDX

- Expected development process of a PCB

1. PCB Board Outline
2. Drill Holes
3. ECAD Areas
4. Component Placements



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Mechanical Engineering Design Process Overview

- Steps below performed by Mechanical Engineer in the Creo product suite:

1. Initial PCB Board Design created by Mechanical Designer in PTC Creo Parametric
2. Mechanical Designer exchanges IDX Baseline of initial PCB Board Design with PCB Designer
3. Mechanical Designer and PCB Designer exchange iterative changes of the PCB Design through Incremental IDX files (order of operations not required)
4. Design is finalized at a developmental process milestone with the exchange of an IDX Baseline.

- Detailed steps listed in appendix of this presentation

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DEMO

- **New Design with Incremental Exchange**
 - Open a staged initial PCB Assembly & Board
 - Save and Send Baseline IDX to ECAD
 - Iterate PCB Design in Creo Parametric
 - Export Incremental IDX and Send to ECAD using the Propose method
 - Import Incremental IDX containing Components and ECAD Areas



AGENDA

- ✓ Introductions
- ✓ Overview of IDX
- ✓ BlackBerry Environment
- ✓ PTC Creo View ECAD Validate & Compare
- ✓ Collaboration Process
- **Best Practices & Looking Ahead**



Best Practices, Potential Issues, & FAQs

- Avoid creating additional Baseline IDX files once original is created
- Use of the Propose IDX exchange method when creating Incremental IDX
- Communication - ECAD and MCAD Designers to communicate during the entire PCB Design process (pick-up a the phone).
- Verify proposed design changes by opening incremental IDX file in PTC Creo View Validate prior to sending IDX file to ECAD designer
- PTC Creo View Validate contains a 'Send an email' button to automate the e-mail transfer of IDX files.
- Via and Mechanical holes should be created as an Extrude (Cut) feature
- ECAD Parameters can be displayed in the Creo Parametric Model Tree
 - **Model Tree Settings** → **Tree Columns** → **ECAD Params**

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Future Capabilities & Planning

- Driving shield can design with the use of unused ECAD Area Types & Parametric Curve Selection
 - Considerations include:
 - Release Control
 - Business Process
- **Concurrent PCB Design**
 - Both Mechanical & Electrical Engineering can work concurrently on their design where IDX communicates differences.



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Closing Points

- **Benefits to using IDX**
 - Time savings
 - Increased Design Collaboration (see exactly what changed, communicate your exact design idea, encourage communication)
- **Ease of Use**
- **Define & Document the PCB Design Process**
 - It could change with the introduction of IDX
- **Engage with the right people**
 - Get executive support
 - Propose this change as a process improvement initiative/project



- Your feedback is valuable
- Don't miss out on the chance to provide your feedback
- Gain a chance to win an instant prize!
- Complete your session evaluation now

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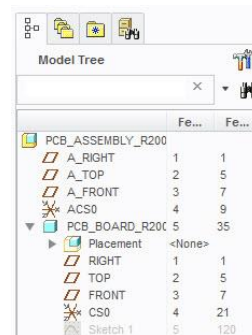
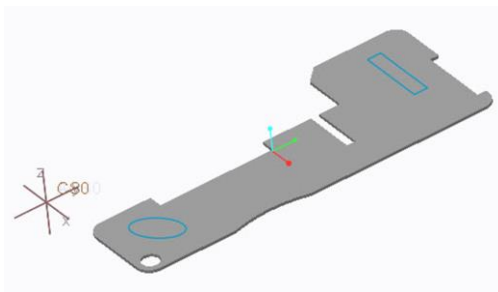
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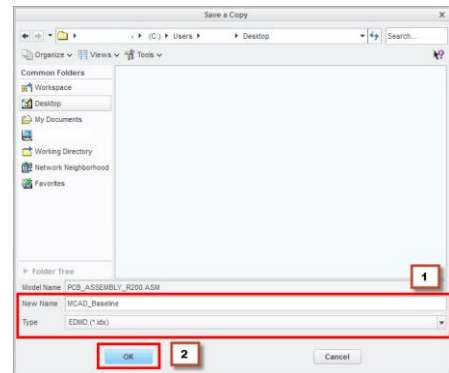
STEP 1 – Initial PCB Board Design

- **Create PCB Assembly & PCB Board Part**
 - Create an Assembly representing the top level PCB assembly
 - Create PCB Board Part in context of the PCB assembly
- **Define PCB Board Outline & Features**
 - Create an Extrude feature within PCB Board part representing the outline
 - Create ECAD Areas & Drill Hole features in PCB Board



STEP 2 – Export of IDX Baselines from MCAD to ECAD

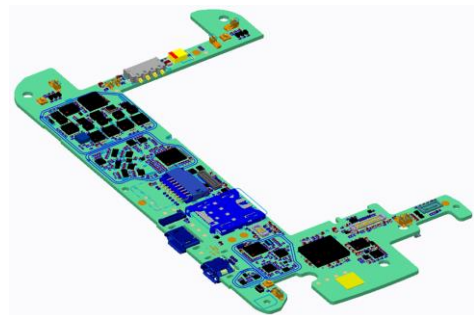
- Activate the 'ECAD_Collaboration' floating license
- Save the PCB Assembly as a Baseline IDX file
 - File → Save As → Save a Copy
 - Type → EDMD (*.idx)
- Send the Baseline IDX to the PCB Designer (via e-mail)



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STEP 3 – Iterative exchange of design changes through incremental IDX

- Three (3) methods of exchanging Incremental IDX design iterations
 1. Export Incremental IDX with Propose
 2. Export Incremental IDX with Compare
 3. Import Incremental IDX with Creo View ECAD Validate

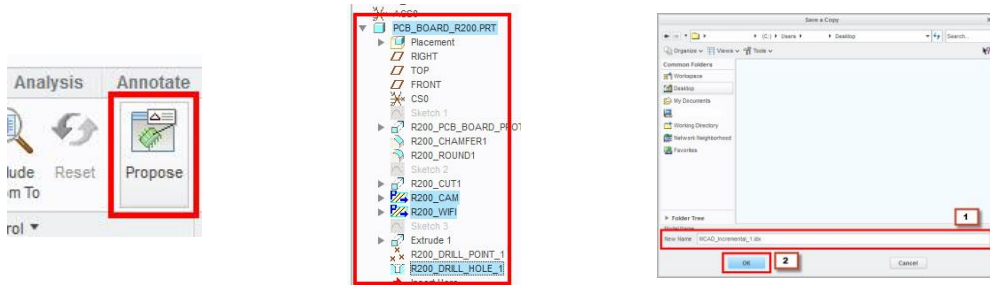


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STEP 3 – Iterative exchange of design changes through incremental IDX

• Export Incremental IDX with Propose

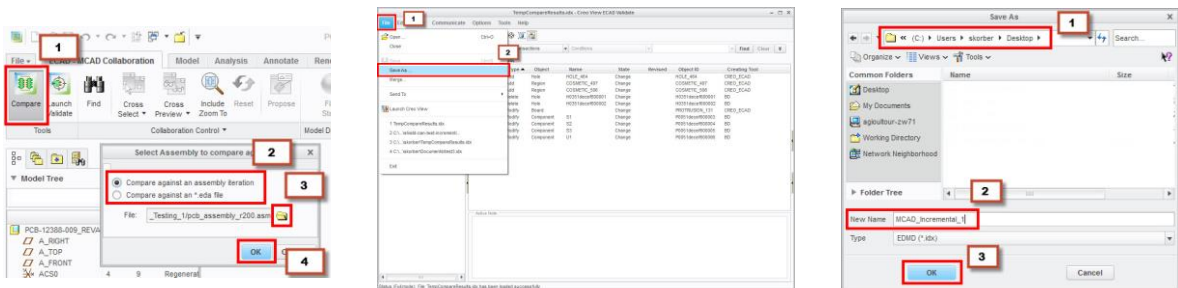
1. While in ECAD Collaboration mode in PTC Creo Parametric, select the modified PCB features from the Model Tree
 - Hold the Ctrl key to select multiple features
2. Select Propose from the ribbon and save the Incremental IDX file



STEP 3 – Iterative exchange of design changes through incremental IDX

• Export Incremental IDX with Compare

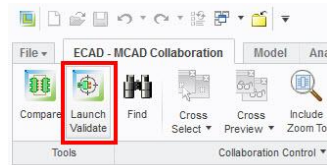
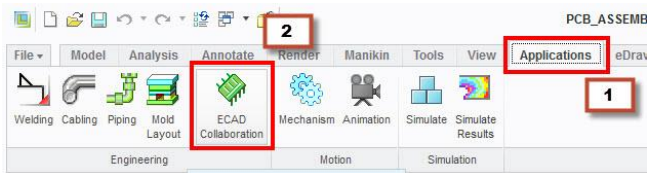
- While in ECAD Collaboration mode in PTC Creo Parametric, select Compare and select the file that the most recent Incremental has been exchanged



STEP 3 – Iterative exchange of design changes through incremental IDX

- **Import Incremental IDX from PCB Designer**

1. Open the PCB Assembly in PTC Creo Parametric & activate the ECAD_Collaboration floating module
2. Launch the ECAD-MCAD Collaboration mode
3. Click Launch Validate to open Creo View ECAD Validate



STEP 3 – Iterative exchange of design changes through incremental IDX

- **Import Incremental IDX from PCB Designer**

1. Select **File** → **Open** and locate the Incremental IDX received from PCB Design
2. By default, select and **Accept** all changes listed in PTC Creo View ECAD Validate
 - BlackBerry preference for the initial pilot projects
3. Select **Ok** from the ECAD Collaboration ribbon to finalize the changes made to the PCB Assembly

