NX PCB.modeler & NX PCB.xchange in Support to NX Flexible PCB Design

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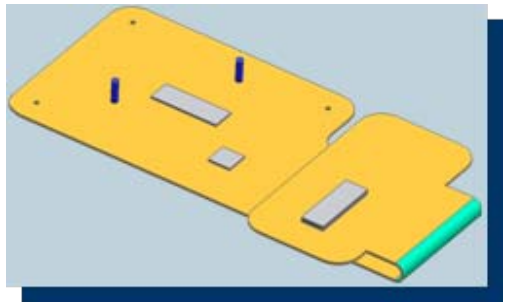
NX ECAD/MCAD – Agenda

- NX PCB.xchange & NX PCB.modeler
  - Typical Design Process
  - The IDF Format
  - Current Plans for NX PCB.xchange & NX PCB.modeler

- Flexible Printed Circuits discussions



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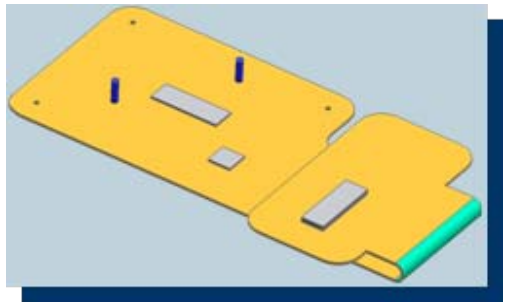


What are NX PCB.modeler & NX PCB.xchange?

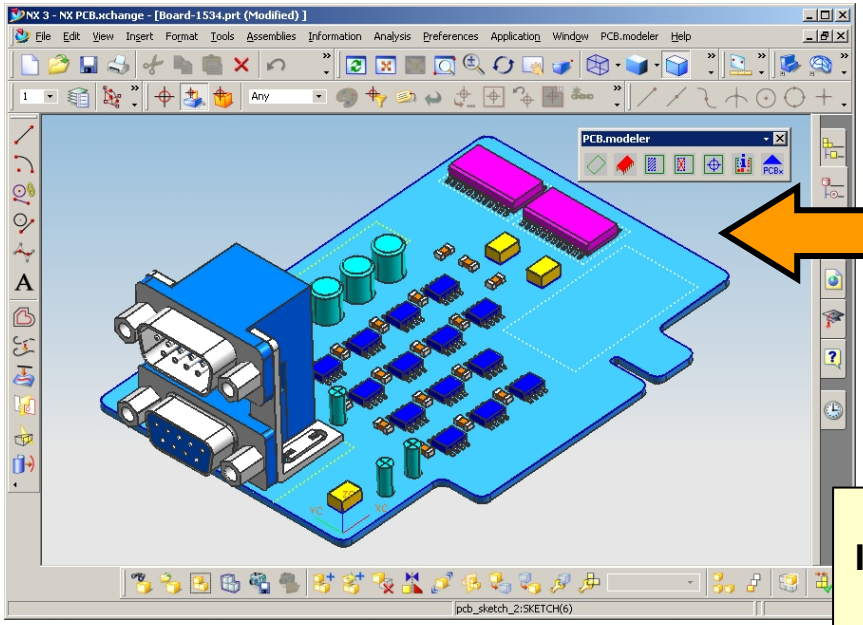
PCB.modeler

- Toolkit integrated in NX and I-deas
- Defines components, restriction areas, drilled holes…
- Validates the PCA and generate HTML reports
- Allows assembly clearance checks, and other packaging tasks to be performed within an integrated environment

PCB.xchange

- Native to NX (as of NX4.0.2)
- Application dedicated to PCB data exchange
- Read/write IDF files (v.2, v.3, and v.4)
- Data filtering during while writing NX/ECAD models
- Generate Detailed HTML reports
- Associative exchange of PCB data with ECAD systems (the NX part is validated and changes are tracked and controlled within the NX environment or Teamcenter environment)

Integration to all major ECAD systems



ECAD PCB Layout

ZUKEN

cadence

Mentor Graphics

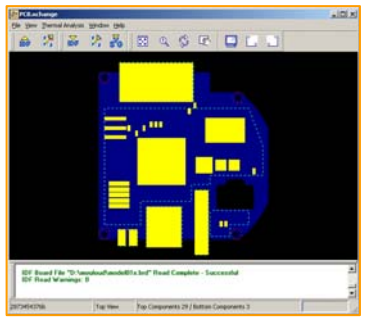
VERIBEST

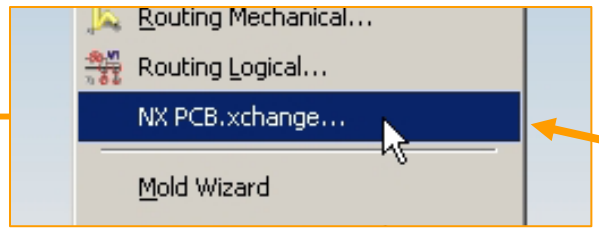
OrCAD

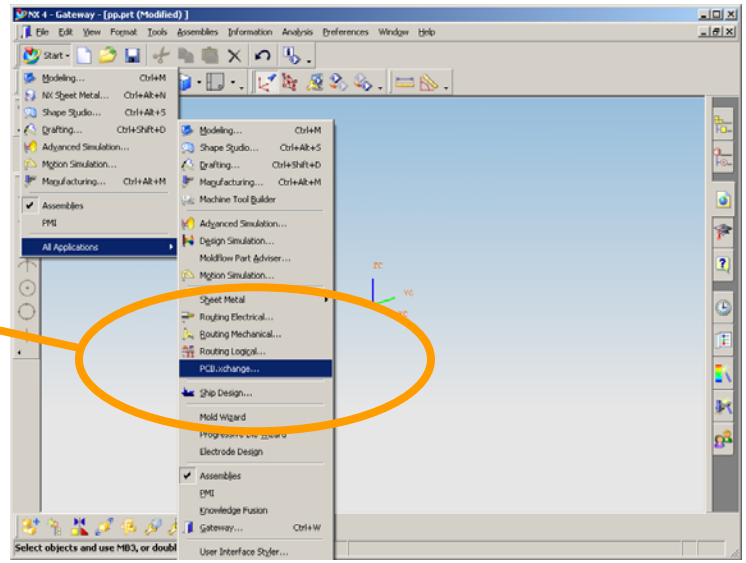
IDF 2/3/4

Zuken CR-5000 in NX5

PCB.modeler & PCB.xchange







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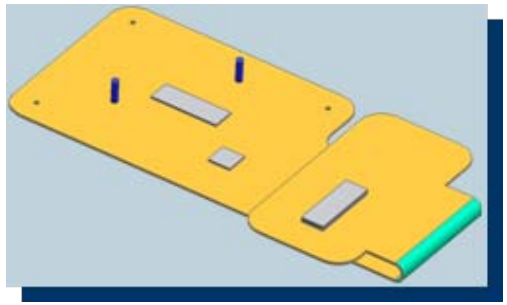
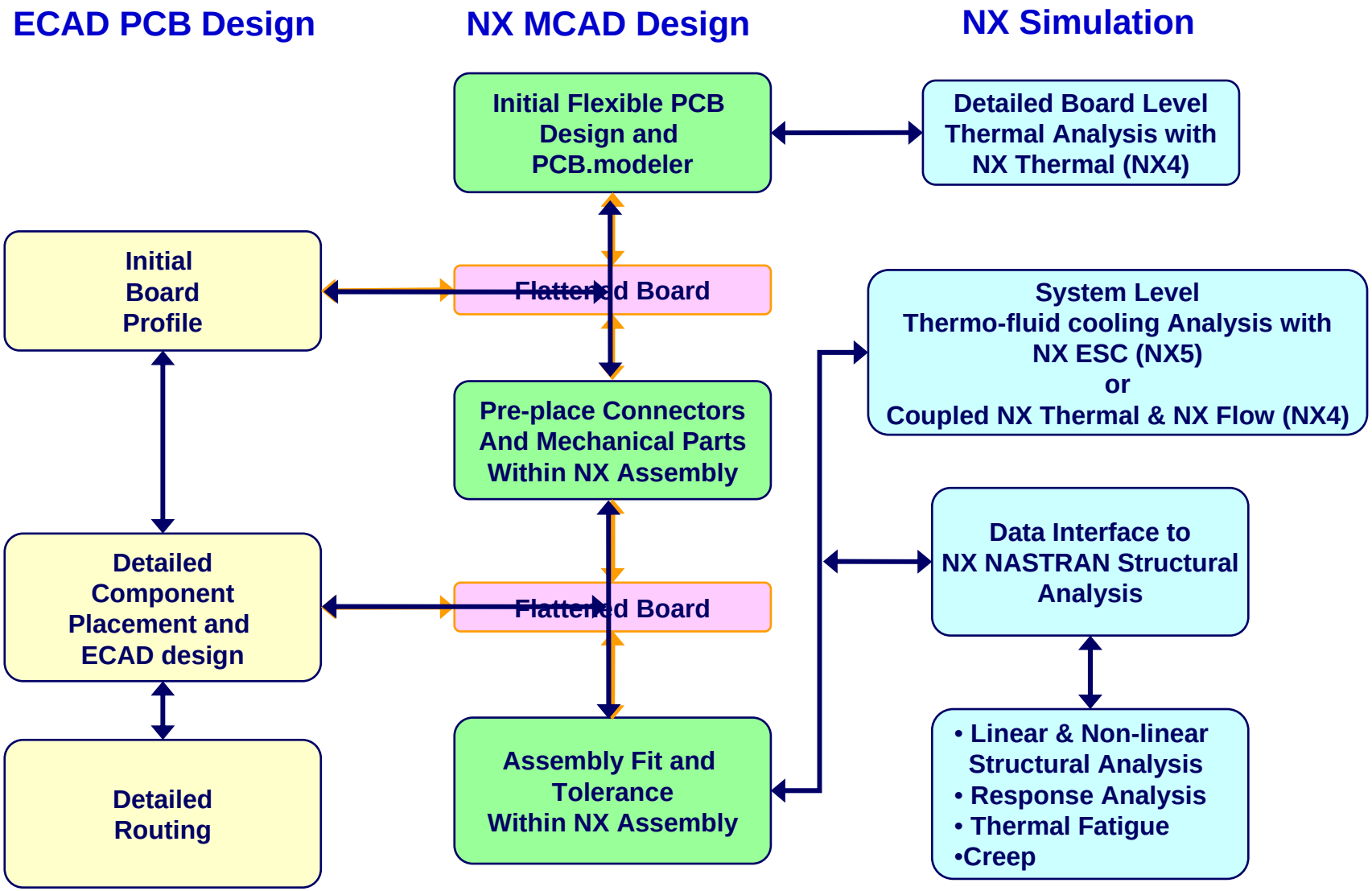
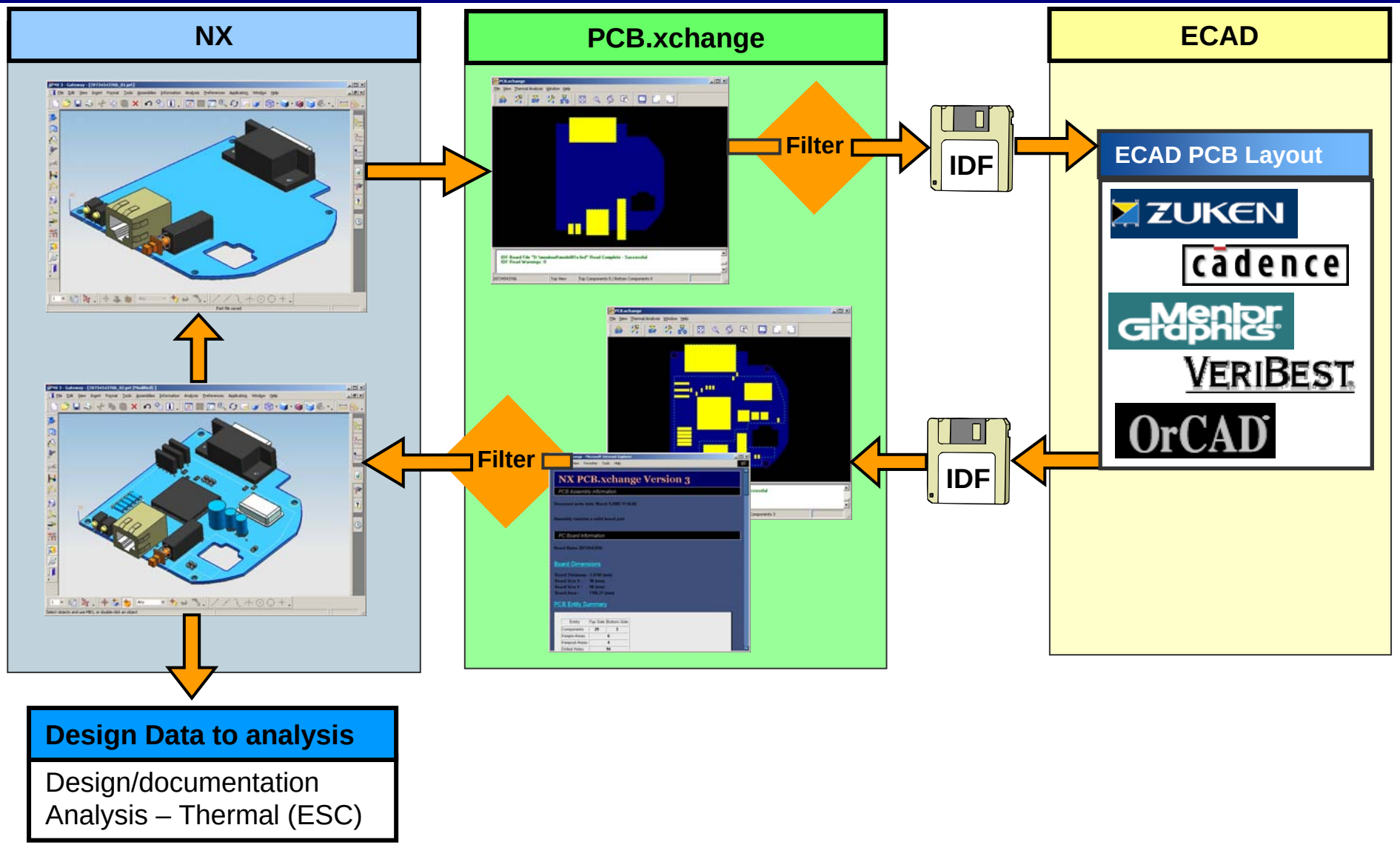


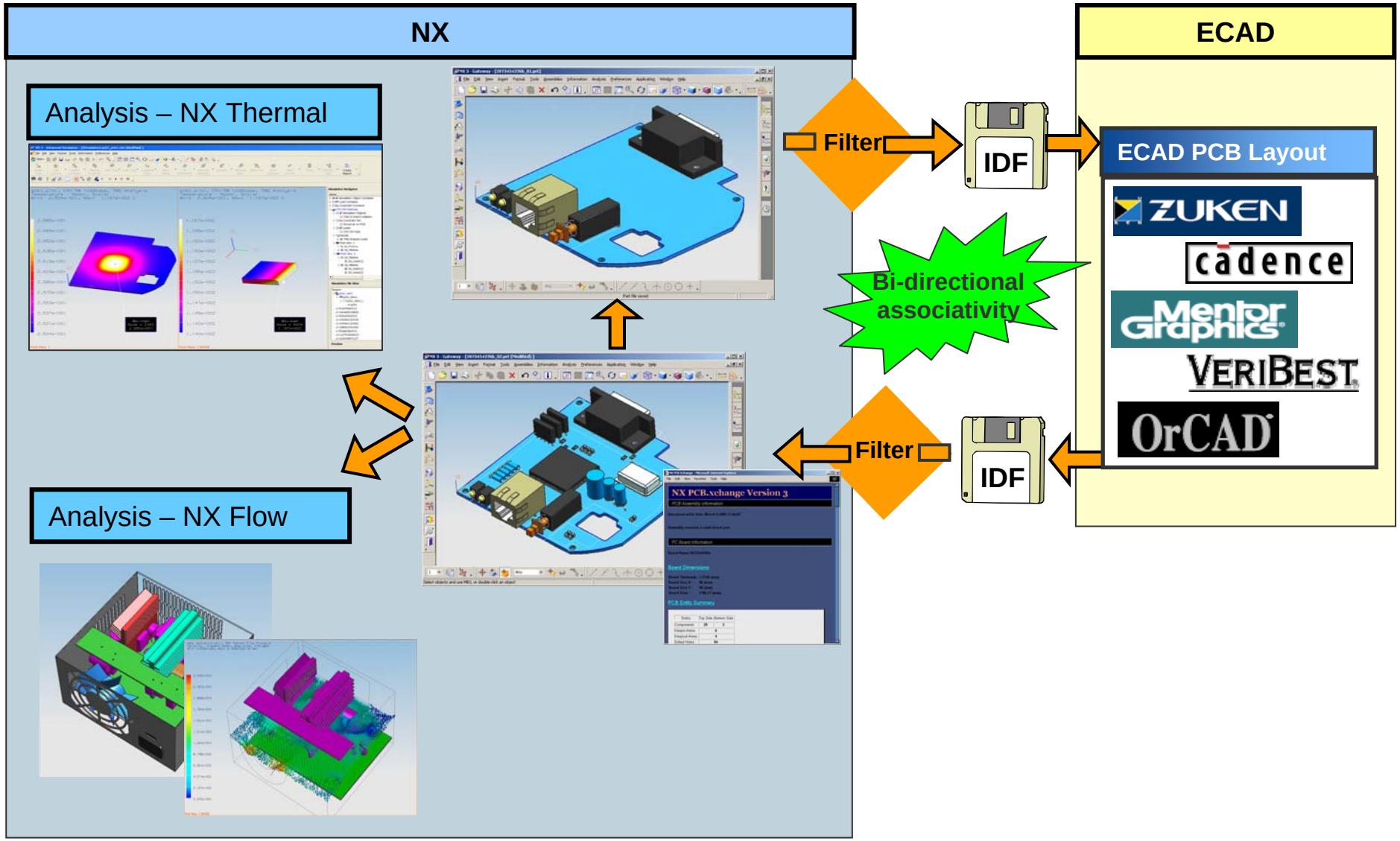
Integrated Rigid/Flex PCB design and analysis



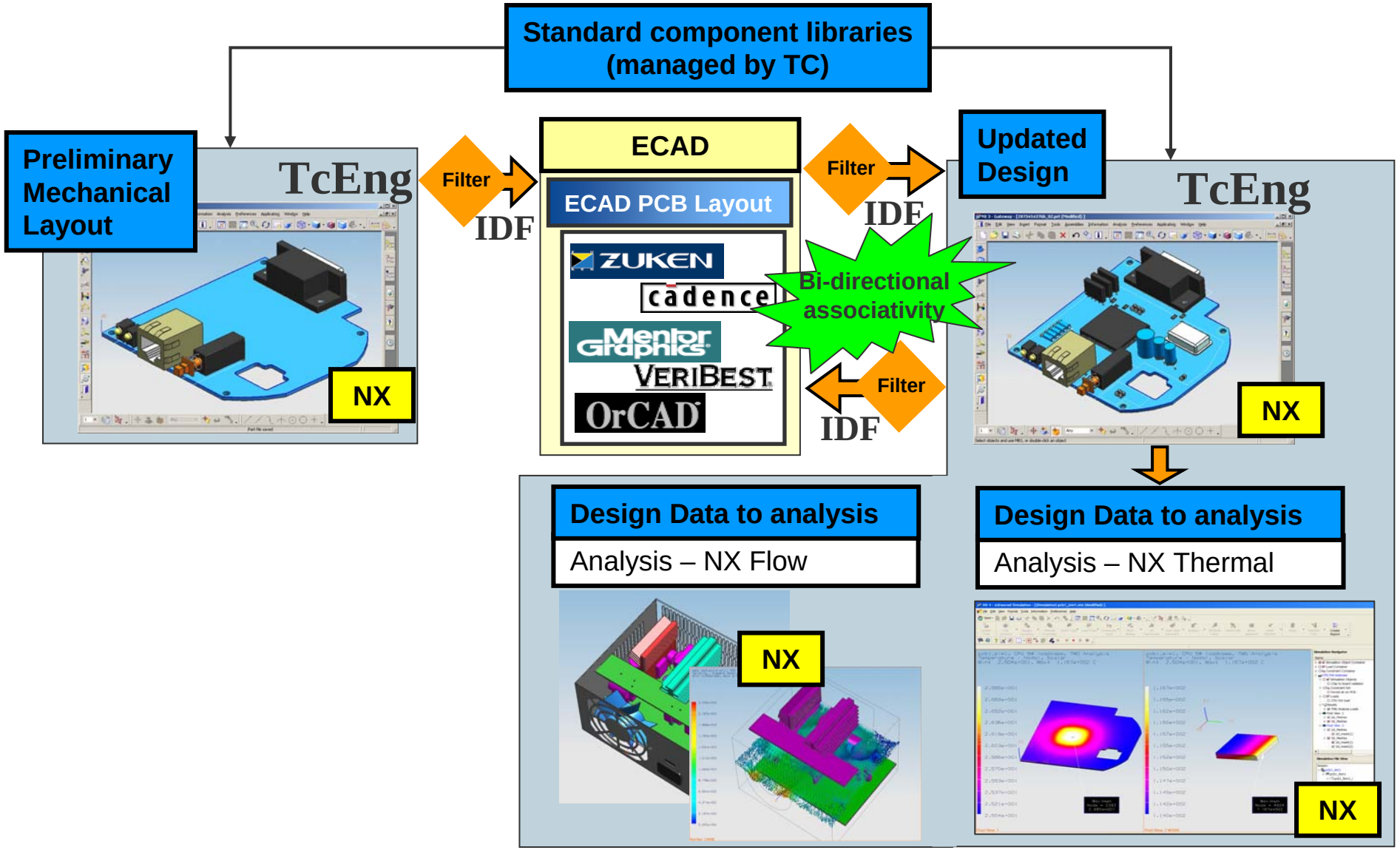
Typical design process in NX 3.0



Typical design process in NX 4.0.1 (without Teamcenter)



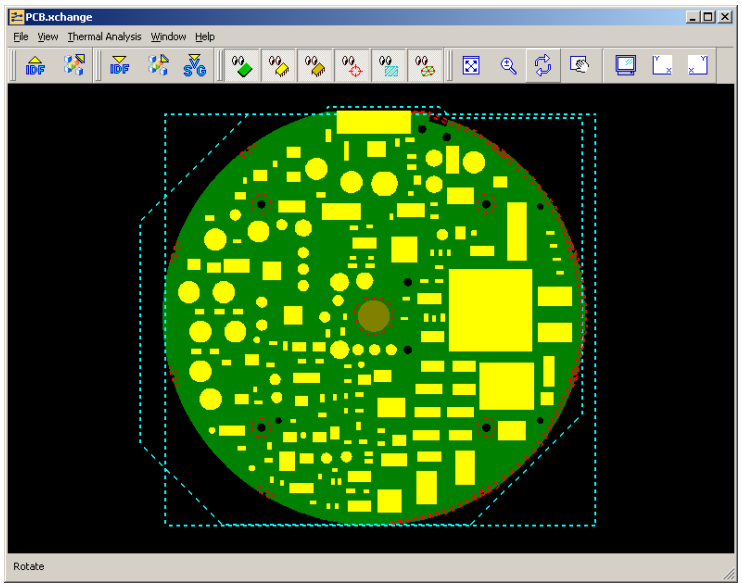
Typical Teamcenter managed design process in NX 4.0.1



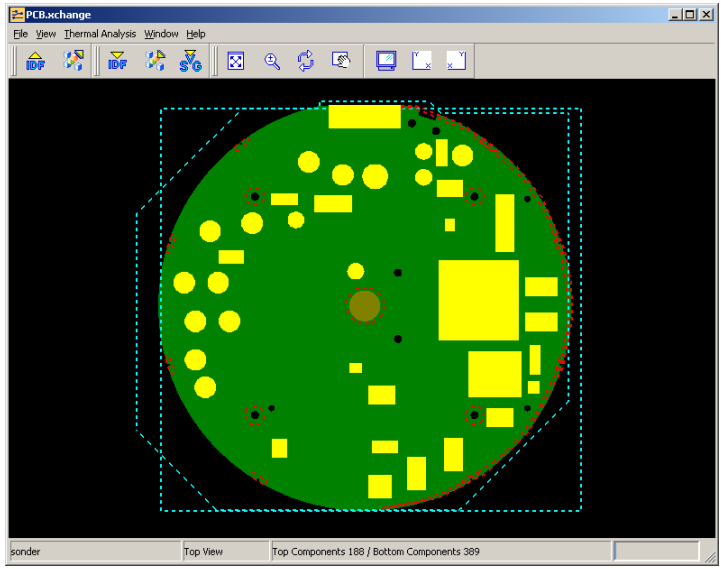
PCB Entity Filtering

Filtering for more efficient assembly modeling in NX

- **Remove small components**
- **Remove small board features, pin holes, etc**
- **Others**



Filtering preview



Compare / Associative Update

NX ←→ ECAD

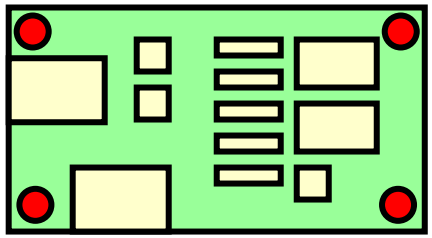
Typical process includes numerous iterations

Goals:

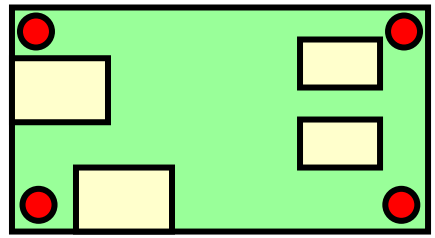
Elimination of tedious work

Faster turnaround time

Elimination of errors



- Board outline
- Board mounting holes
- Component mounting holes
- Placement keep-outs
- Critical components



- Board outline
- Tooling holes
- Fidutials
- Additional Placement
- Routing Areas
- Component Placement

What is unique about NX PCB.xchange?

- Native application to NX (NX 4.0.2)
- Complete support for IDF2, IDF3 and IDF3+, IDF3 is the most common format today
  - Format supported by all major ECAD vendors
  - Most competitors support only IDF2 and often not complete support
- Bi-directional data management: data filtering, compare and update and library management
  - Most competitors are “dumb” translators, and don’t really manage the design process
- Support for thermal data and downstream NX Thermal simulation
  - None of the competitors do this
- Support for thermo-fluid assembly NX Flow simulation
  - None of the competitors do this

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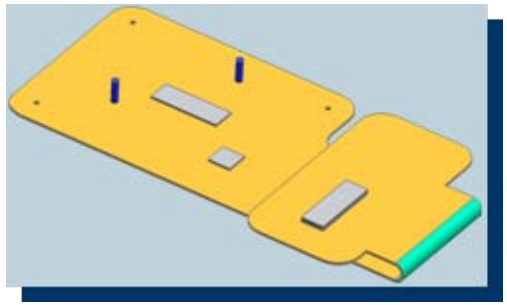

What is the “Intermediate Data format” (IDF)?

- **Standards (such as IGES) do not contain the semantic content to communicate PCA product design data**
- **IDF bridges the gap between ECAD, MCAD and CAE with rich definition of PCA design**
- **Standard managed by Intermedius**

- Now the de facto industry standard for PCA data exchange
- Previous versions of IDF had limited thermal support
- Currently supported by all major MCAD and ECAD vendors
- MAYA supports and drives the Intermedius requirements for CAE Simulation and ECAD/MCAD needs

Intermediate Data Format file content

- **Board Data**
  - Name, number, version, owner
  - Board outline, with cutouts
  - Drilled holes, with properties
  - Restriction areas (keep-in and keep-out)
  - Thermal data

- **Component Data**
  - Name, number, reference designator, owner
  - Placement (location, offset rotation, side of board)
  - Footprint outline and height
  - Thermal data

- **Other Attributes Data**
  - IDF provision for any other data transfer

IDF support in NX PCB.xchange

- **NX PCB.xchange has a complete support:**
  - **IDF v2.0 and v3.0**
  - **Mentor's Autotherm IDF v2.5**

- **NX PCB.xchange has a partial support:**
  - **IDF v4.0**

- IDF 3 is the most widely supported version
- IDF v4.0 is not yet in use in industry
- Most competitors support only IDF v2.0 and often not complete support
- Full support for IDF v4.0 is planned for release with NX 5.

IDF Entity Support

Entity Type	IDF 2.0	IDF 3.0	IDF 4.0
Panel Assembly Definitions & Instances			
Board Assembly Definitions & Instances			
Panel Part Definitions & Instances			
Board Part Definitions & Instances			
Component Part Definitions & Instances			
3D Part Shapes with Cutouts & Cavities			
Holes (Mounting, Tooling, Pin, Via)			
Conductors (Pads, Traces, Filled Areas)			
Routing & Placement Outlines			
Keepouts (Routing, Trace, Via)			
Graphics			
Annotations			
Figures			
Footprints			
Sublayouts			
Component Thermal Characteristics			
Board Design Variants			
Miscellaneous Properties			
Entity Owners			

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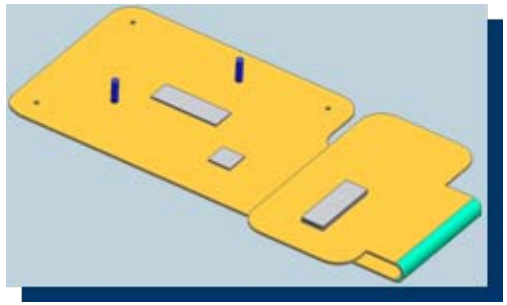
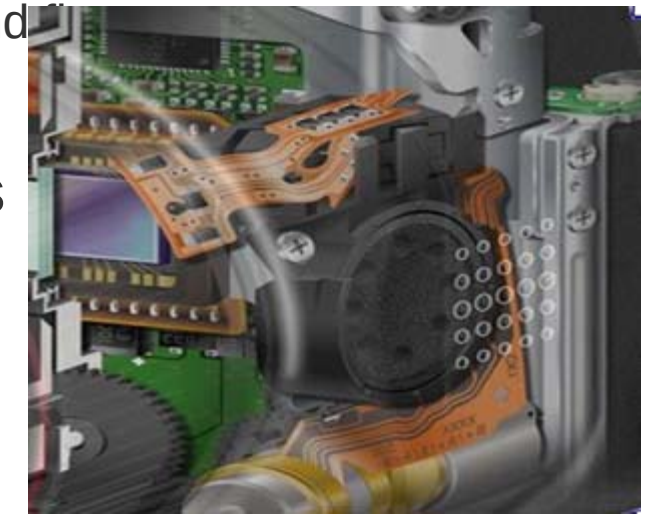


NX PCB.m/x Development Plans

- **NX 4.0.[1&2] timeframe [done]**
  - Native NX PCB applications
  - Add support for PC boards defined as assembly components
  - Support of keep-ins/keep-outs defined as curves/edges/surfaces
  - Add keep-ins/keep-outs line style control
  - Simulation already available if license of NX Flow and NX Thermal are available, which are the 2 newly integrated simulation solutions in native NX 4
  - Partial support to the new NX Flexible Printed Circuit design product
  - Teamcenter native support
  - Native implementation filters
- **NX 4.0.3 timeframe [current work]**
  - Alpha release of Zuken CR-5000 support
- **NX 5 timeframe [current work]**
  - Full support to the new NX Flexible Printed Circuit design product's API
  - Support of Zuken CR-5000 data exchange
  - Native NX associative compare and update
  - Provide samples of NX part libraries
  - Support to boards as multiple bodies
  - Support to connector wire patterns
  - Automatic hooks to the NX ESC powerful 3D thermo-fluid simulation product (product also authored by MAYA, but native to NX)

What are Flexible Printed Circuits ?

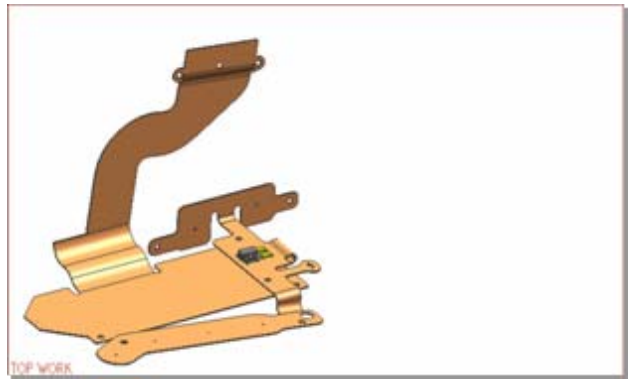
- Printed Circuits geared to 3D applications
  - Conform to 3D mechanical shapes
  - Designed to bend around tight corners and fi in cramped spaces
  - Used to solve packaging problems
- Combine rigid and flexible materials
  - Designed as all flex
  - or combination of rigid & flex
- Paper thin construction
  - Light weight, small size
  - Most applications <1mm thick
- Widely used
  - Consumer Electronics, Automotive, Aerospace, Medical Instruments, Telecommunications, Etc.

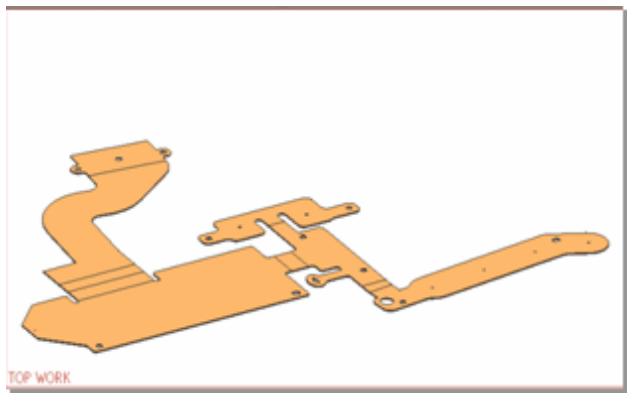


PCB.xchange in support of Flex Printed Circuits

Objective

Provide a set of solutions for the effective design sharing of flexible printed circuits between NX and ECAD systems





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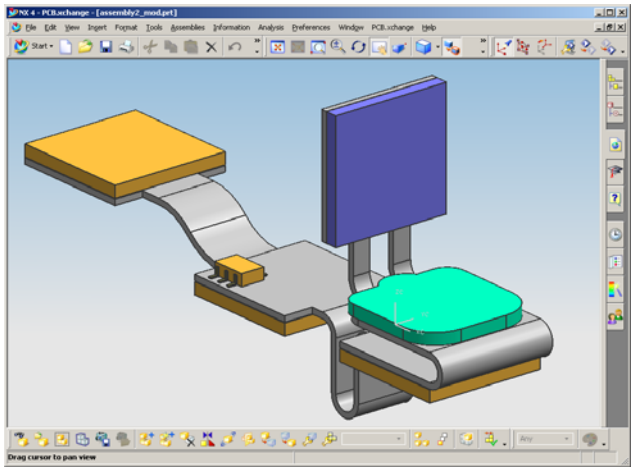
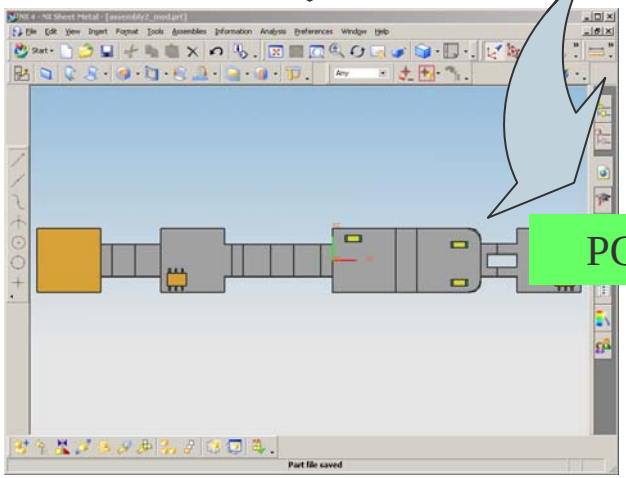


NX Flexible Printed Circuit Design
Powerful FPC design tool



PCB.xchange

ECAD PCB Layout

- ZUKEN
- cadence
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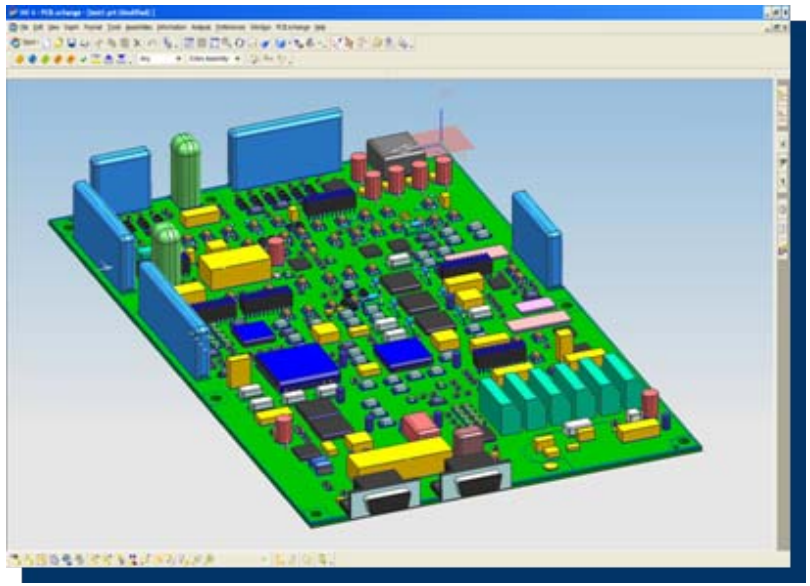
- Extended Exchange format
  - IDF v3++
  - IDF v.4
  - Others PLMXML, etc

NX PCB.modeler & PCB.xchange Demo



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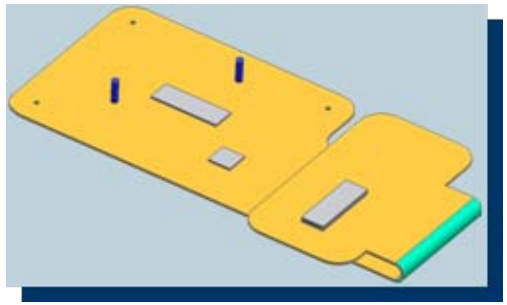

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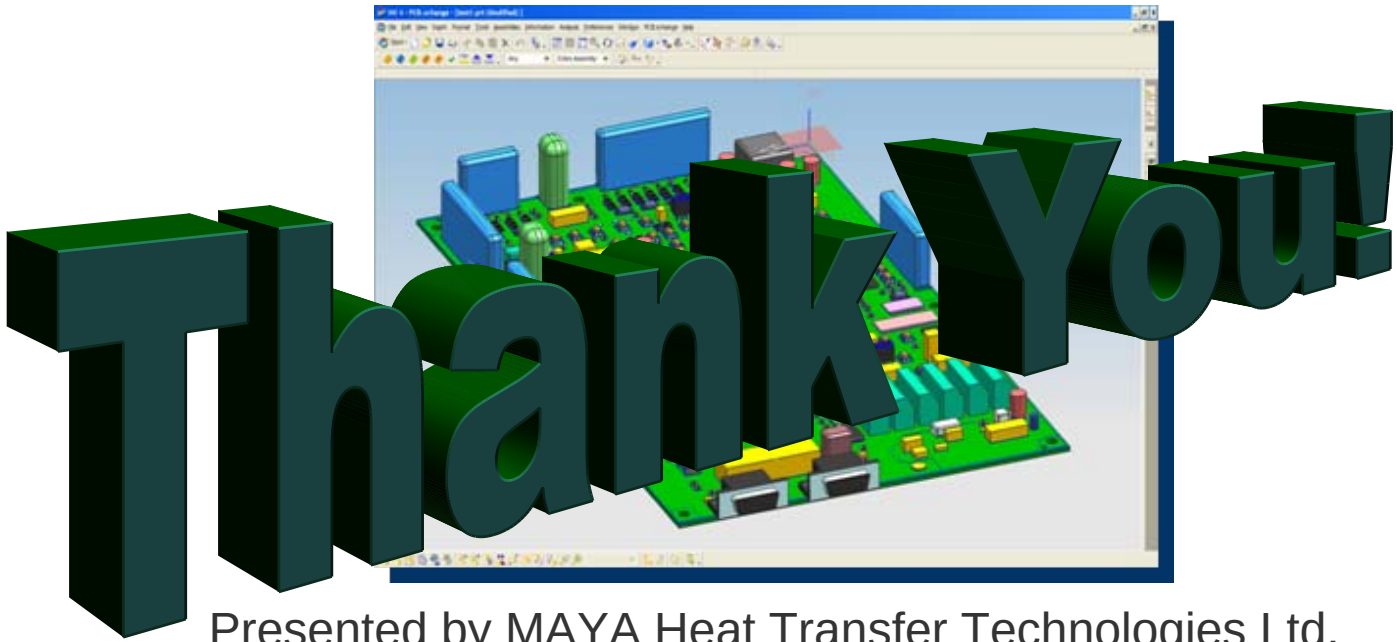

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