pure engineering™

INTERCEPT

The world's leading supplier of technology independent PCB, Hybrid, and RF design and layout software

Intercept – About Us

- Incorporated in 1983 as an EDA consulting firm
  - Awarded consulting contracts for Hardware Design and Research and Development.
  - Contracts included Public and Private Sectors, Government, and EDA Industry in Signal Processing, Microelectronics, Electronic Systems, and PCB Design
  - Developed IPC-D-350 Artwork Interface, CAD Translators, Import/Export Artwork and Verify Artwork as OEM Supplier to Mentor Graphics
- Introduced Pantheon Product Family to Public – DAC 1996
- First European Office Opened in France – July 1997
- Acquired Xynetix PCB Business – October 1998
- Opening of New German Sales/Support Office – February 1999
- Intercept Design Group formed for Customers – Aug. 1999
- Opening of New UK Sales Office – October 1999
- Introduced Mozaix schematic capture – September 2000
- Introduced Indx Library Management – January 2002

Intercept – About Us, Cont'd.

- Introduced redesigned User Interface for Mozaix in 2005.
- Introduced, in partnership with Matrox, new auto interactive routing capabilities in 2006.
- Introduced, in partnership with Calix Networks, new physical hierarchical block reuse in 2006.
- Introduced enhanced block design and design reuse technology in 2007.
- Introduced, in partnership with Honeywell Aerospace, the new Design Automation application suite: DesignX, DrawingX, QCX, and ReleaseX.
- Opened New Milan, Italy Office in 2007.
- Introduced Xtent Technology Rules Editor and Constraint Manager in 2009.
- All development and support is accomplished in US.
- ITAR compliant.

Strategic Partnerships

The Goal: work together to provide a win-win for both parties whether it be improved technology, improved business activity or both.

The Execution of a Successful Partnership:

- Put together a scope of work that both parties agree on and are committed to.
  - Provide the appropriate resources for success.
  - Commit to agreed upon schedules and deliverables.
- High touch communications through all stages of development
- Assign Liaison who will:
  - Work with Raytheon stake holders to identify needs.
  - Prioritize requirements.
  - Work with Intercept to clearly document requirements.
  - Meet with Intercept for Milestone reviews.
  - Communicate testing results and provide feedback for Alpha/Beta releases
- Dedicated resources
  - Work with Raytheon to define and document requirements
  - Focal point between Raytheon and ITI Engineering
  - Milestone reviews and progress reports with Raytheon
  - Deliver and demo Alpha/Beta releases.

Partnership: Raytheon

1998-Present

- Intercept has been working with Raytheon since 1998, when it acquired the Scicards installation at Tewksbury.

- Raytheon's guidance for over 10 years has resulted in countless improvements to Intercept's software suite for Hybrid, RF and standard PDB design flows.

These improvements have directly affected Raytheon's design flows, with a history of proven positive results.

Partnership: Raytheon, Continued

- For each of the following eleven years, Raytheon has bought additional Intercept applications at various sites almost annually.

- The number of Raytheon sites using Intercept applications has expanded to four.

- Each time Raytheon has purchased additional licenses, Intercept has provided a corporate discount level well below list price.

- Raytheon currently owns 23 Pantheon Layout licenses, 18 Mozaix Schematic Capture licenses, 17 licenses for technology options and automation products, and 36 licenses for interfaces and translators.

- Raytheon divisions owning Intercept tools include SAS (Dallas and El Segundo), ACS (Tewksbury), and RMS (Tucson).

Raytheon Successes to-date

- First two designs in Dallas involving conversion of DXF to intelligent data were completed on time and with no issues during manufacturing.

- Several hybrid designs in El Segundo were completed on time. These were built from the ground up and included creation of library parts, schematic and layout. The designs were completed without the users having any formal training and ahead of schedule.

- Currently in the process of developing a translator to import Mentor Supermax design directly into Pantheon.

Partnership: Honeywell

1998-Present

- Worked together to enhance the bi-directional interface to Microwave office and the RF user flow in Pantheon.
- Collaborated with the specification and design of the Xtent Technology Rules Editor for high speed design.
- Instrumental partner in specification and development of the automation tools:
  - DesignX
  - DrawingX
  - QCX
  - ReleaseX

Partnership: Matrox

2006-Present

- Worked closely with PCB design team to greatly enhance usability and performance of interactive routing.
- Collaborated on specification and testing of next generation Auto-Interactive Routing
  - Performance and shove-aside are now fluid, with nearly no delays and real-time shove/heal of objects.
- Improved high speed design options.
  - From-to definition and auto-tune is now best-in-class
  - New signal path constraint definitions and auto-tune shortens design time by simplifying design challenges.

Partnership: Calix Networks

2004-Present

- Closely involved in a major full-site migration of 45+ Mentor Graphics designs from DA and Board Station to Mozaix and Pantheon, including LMS library translation.
- Collaborated with the specification and design of the Xtent Constraint Manager for high speed design.
- Instrumental in the specification of the physical and logical design reuse technology in Intercept products.
- Assisted in the specification/definition of the new Backdrill features in Pantheon.

Partnership: National Instruments

2007-Present

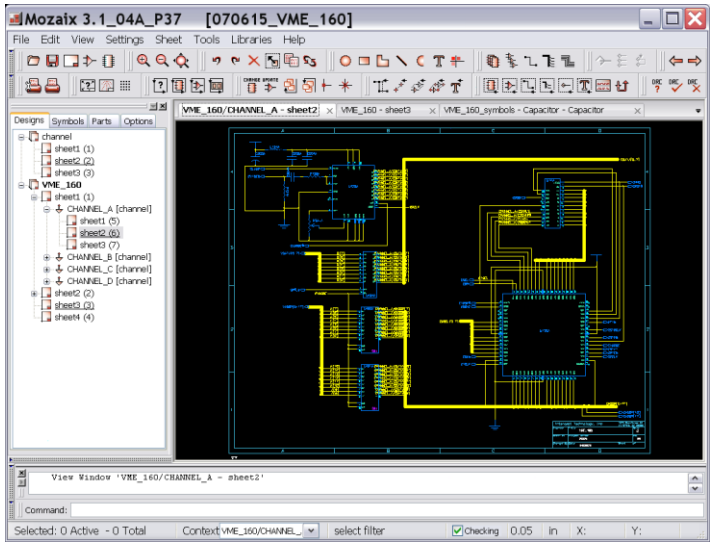
- Intercept and NI worked together to enhance Pantheon's RF capabilities.
  - Resulting enhancements provided RF designers with Pantheon-exclusive RF functionality that boosts product design cycle times exponentially.
  - Developed a new area fill type that allows RF Engineers to draw any area fill shape without DRCs interfering.
- Aided in site migration from Mentor Design Capture and Expedition by helping test issues and finalize translators for Import DC Edif and Import Expedition.
- Full translation of Design Capture library to Intercept format.
- Adopted Intercept IDF interface, which replaced internal customizations for National Instruments' mechanical environment.

Intercept Translators & Interfaces

- Schematic, layout, and library translators enable seamless 'EDA plug & play'
- Pantheon interacts with most CAD/CAM systems
- Includes support for industry standard manufacturing formats
- Import geometries from corporate, design, or user libraries
- Transform manufacturing databases into intelligent PCB data through reverse engineering with **Import Artwork**
- Correct and refine foreign databases in Pantheon

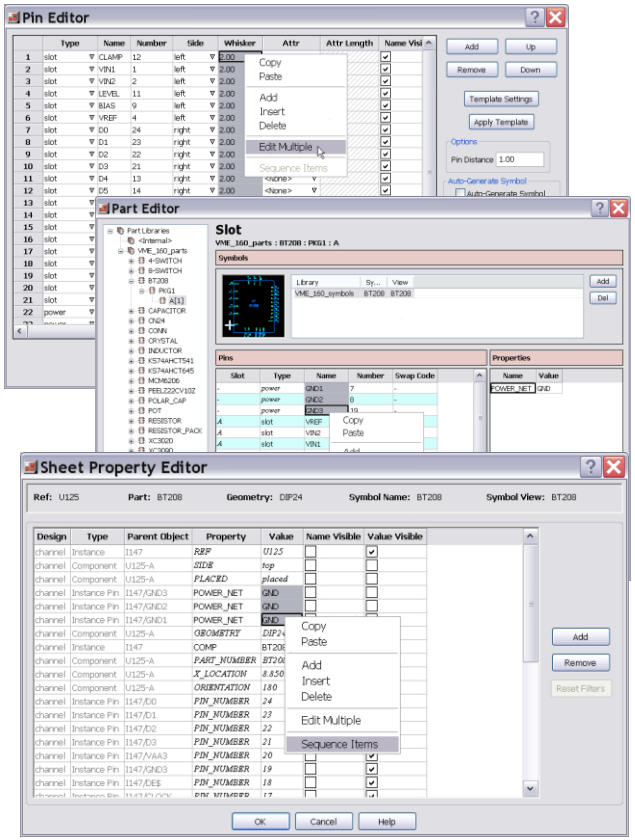
Schematic Translators	**Design Architect** **Veribest CAE** **Protel**	**Viewlogic/ePD** **Orcad** **Edif**
Library Translators	**Mentor LMS** **Veribest**	**Viewlogic** **OrCAd**
CAD Translators	**Applicon** **Board Station** **Cadnetix** **Calay Prisma** **Calay V04/V05** **CV Cadds** **CV Theda** **Expedition** **EEDP (custom)**	**ODB++ (export)** **OrCAD** **PADS** **PCAD** **Protel** **Scicards** **Telesis** **UniCAD** **Visula**
Interfaces	**CircuitSpace(DA)** **GDSII** **GenCAD** **Generic DXF** **Quad XTK**	**Smart DXF** **Hyperlynx** **IDF** **IFF** **SiSoft**

Mozaix Key Features



- Project Explorer panel for browsing one or more schematic designs, parts, and symbols.
  - Drag and drop parts and symbols directly onto sheets.
  - Hierarchical design display.
- Multi-window display for editing sheets, symbols and parts on the fly.
- Quick Search & Place of library parts with Part Browser.
- Copy or cut/paste design sections from sheet to sheet or merge full sheets and designs from separate databases.
- Net connections recognized across entire design at all times.
- Forward and back annotation with Pantheon.
- Cross-probing and Multiple Design Variant Support

Mozaix Key Features - Continued

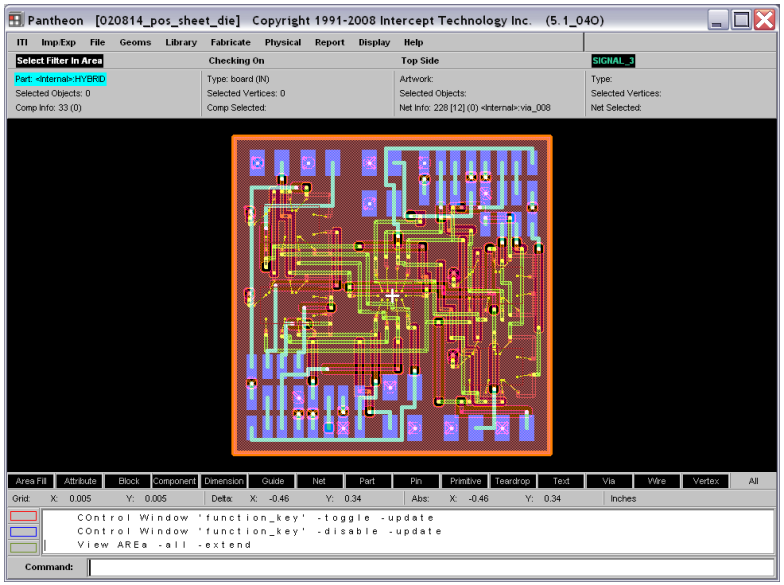


Mozaix's Pin Editor, Part Editor, and Property Editor offer powerful quick-edit features.

- Spreadsheet-style editors with time saving features.
- Design Reuse with Replicated Hierarchy and/or Physical Hierarchy (Block geometries in Pantheon).
- DRC panel that allows users to view and correct errors on the fly while scrolling through the DRC report.
- Pin Editor with auto generate symbol and block symbol capability.
- Change parts or switch geometries or symbol views in one quick step.
- Perl scripting interface for user-specific customizations.

Pantheon Key Features

- Single File Database
- 30+ Interfaces, Translators
- In-Session Geometry Creation
- Rules-Driven Place and Route
- Intuitive Interactive Routing
- Auto-Router Interfaces (SPECCTRA)
- WYSIWYG Area Fills
- PCB/Hybrid/RF in 1 application
- High Speed Features
- Artwork Generation
- Design Verification
- Design Reuse
- PDF Outputs



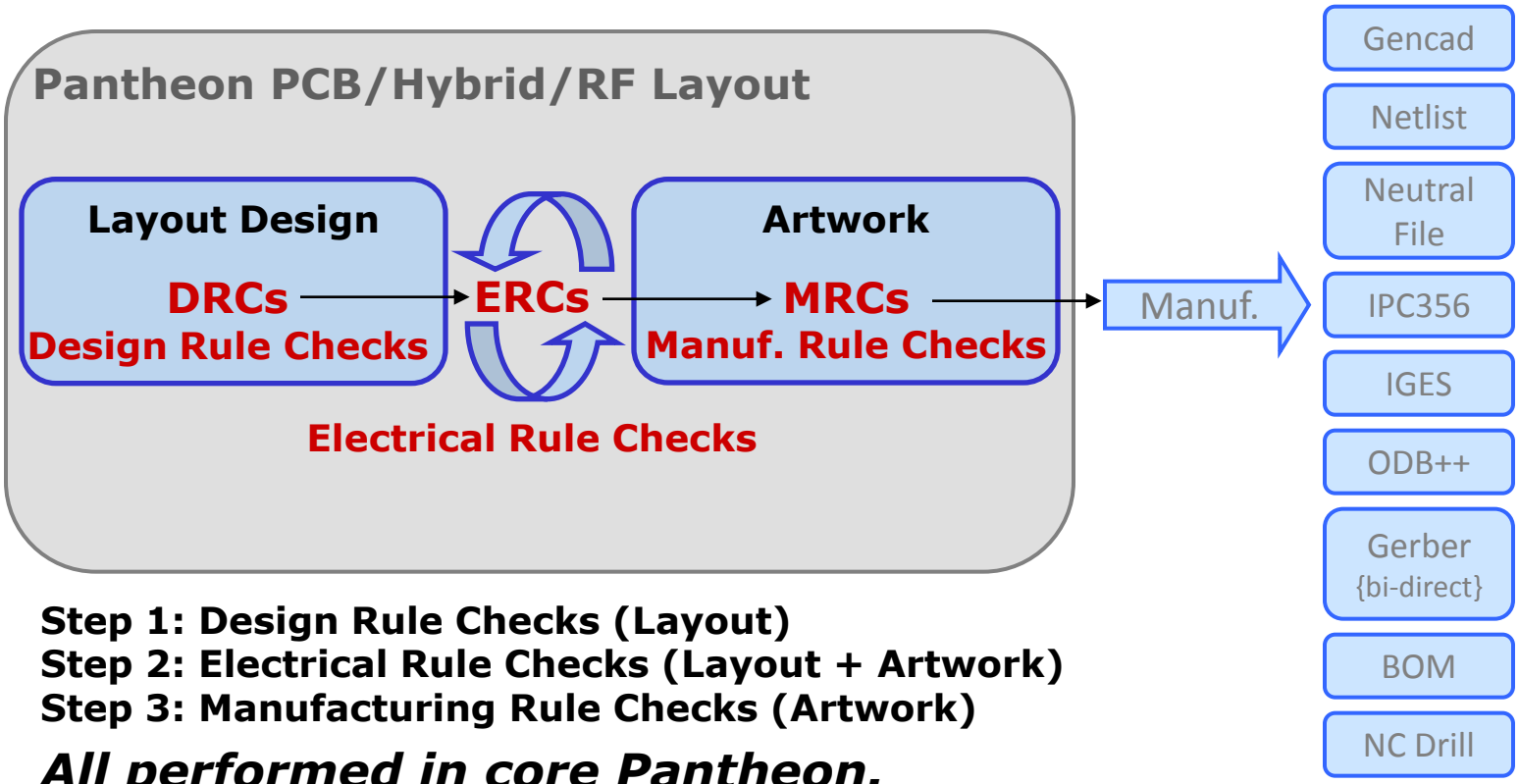
INTERCEPT

Pantheon Key Features - continued

- Bi-Directional IDF support for 3D mechanical packages:
  - PTC/ProE
  - Solidworks
  - Mechanical Desktop
  - Inventor
  - Etc…
- Bi-Directional DXF support for 2D mechanical.
- Signal Integrity interfaces:
  - Hyperlynx
  - SiSoft
  - ICX
  - Sigrity

Pantheon Artwork/Manuf. Verification

Triple Pass Verification System in Pantheon



Step 1: Design Rule Checks (Layout)
Step 2: Electrical Rule Checks (Layout + Artwork)
Step 3: Manufacturing Rule Checks (Artwork)

All performed in core Pantheon.

INTERCEPT

Pantheon v6.0: Enhanced Interactive Routing

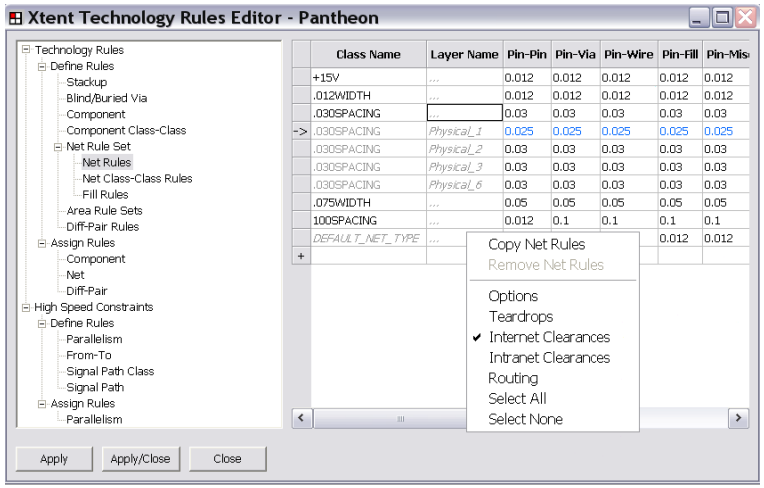
- Guide Route now over 300% Faster
  - Improved Algorithms for Better Completion
  - Improved Active Cleanup while Routing
  - Improved Shove-Aside Algorithms
  - Radically Faster Route Completion
- Cleanup Improvements
  - Cleanup By Section Option
  - Cleanup Preserving Obstacles Option
    - » Keep Routing around Vias, holes, etc
- Auto Panning while Routing
- Ability to Highlight Nets
- New Dynamic Slide-Via Capability
  - Dynamically drags Affected Wires
  - As with Routing, Ghost Reflects Location Viability
    - » (Red – Not Possible, White – Completes with DRCs)
- Autotune Option to Add/Remove a Delta Amount

Intercept Standards

Intercept is Fully Committed to Supporting Industry Standards

- Intercept currently supports many standards, including:
  - IPC350C
  - IPC356
  - IPC356A
  - GenCAD
  - Gerber/Gerber 274x
  - DXF
  - IGES
  - GDSII
  - ODB++
  - … and more.
- GenCAM (IPC2510) is fully certified by the IPC.
- Currently evaluating STEP AP210.

Xtent Technology Rules Editor



- Integrated, single-source technology rules and high speed constraints editor.
- Spreadsheet format with quick copy/paste features.
- Stackup and Via Previews
- Color-coded highlights to indicate violations.
- Easy-to-use formulas for constraining pin-pin and net lengths.
- Support for signal paths containing more than one net.
- Ability to assign Signal Path Class rule to any defined signal paths.
- Auto-generate diff-pairs and signal paths with pattern matching formulas.
- Autotune from-to and signal paths in real-time from Xtent.
- Length status column visually indicates violations, updates in real-time.

Design Automation: DesignX

- Enables designers to perform comprehensive design-to-design and design-to-library comparisons of product data.

- This capability proves beneficial for managing team-wide changes to product data as well as for verifying design and library integrity prior to releasing products for manufacturing.

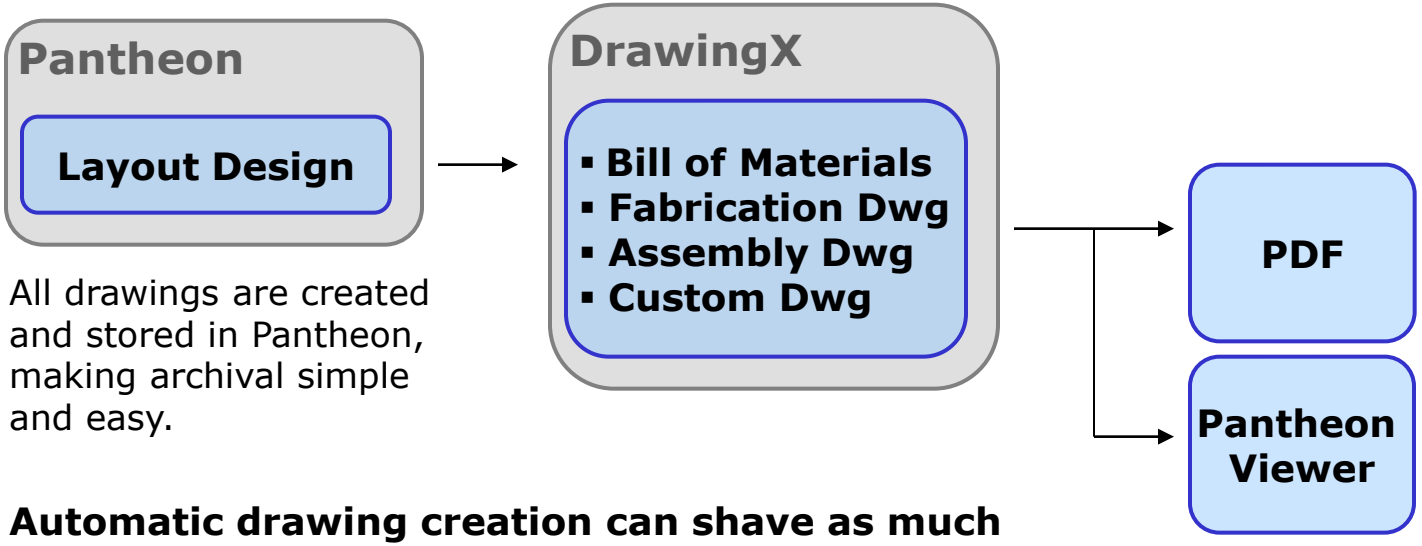
- Specific capabilities of DesignX include:
  - **Symbol Check**. Identifies graphics, pin, property, and text changes between design and library symbols.
  - **Geometry Check**. Pinpoints exact changes that are present between design and library geometries.
  - **Component Check**. Reports all component changes between successive copies of a design.
  - **Net Check**. Reports all net changes between successive copies of a design.
  - **Trace Check**. Reports all area fill, via, and wire changes between successive copies of a design.

Design Automation: DrawingX

- DrawingX allows users to automatically generate complex assembly and fabrication drawings according to a defined standard.
- Users may create entire drawing packages simply by choosing a drawing profile from a dialog list.
- To set up drawing templates, users may import existing, completed drawings and characterize the various features present on the drawing.
- DrawingX will automatically generate all required drawing features, such as the stack-up diagrams and part lists.
- Each drawing is automatically assembled with geometric tolerances, if specified.

Design Automation: DrawingX

DrawingX Flow Diagram



All drawings are created and stored in Pantheon, making archival simple and easy.

Automatic drawing creation can shave as much as a week from a single design cycle.

View released drawings in PDF format or native Pantheon format.

INTERCEPT

Design Automation: DrawingX

- Users can also utilize features from DrawingX's drawing palette, which includes the following:
  - Added Text
  - Artwork Table of Contents
  - Assembly Notes
  - Board Placement View
  - Board Stack-up Diagram
  - Dimensioned Board View
  - Dimensioned Library Part Prints
  - Drill Schedule
  - Fabrication Notes
  - Parts List
  - Revision History Table
  - Staged Assembly Diagrams

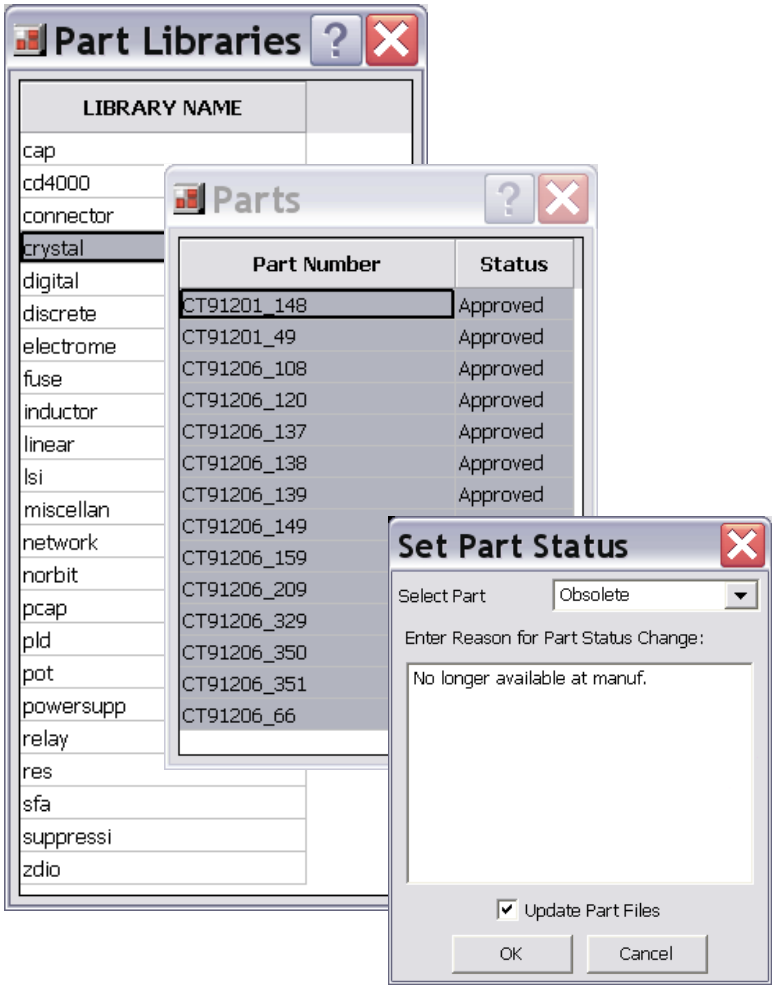
Design Automation: QCX

- Provides a method for encapsulating complex verification processes to ensure DRC's, ERC's and MRC's are performed completely and according to manufacturing requirements.
- Allows users to select a "build-to" process, and automatically performs quality assurance tests to ensure that all design rule guidelines are met.
- Enables CAD users to quickly set up technology rules for designs simply by selecting a process profile that they would like to use with the design.
- Can set up process-specific rules for nets, pins, vias, component clearances, as well as verify that the board and its components meet the standards set for the selected process.

Design Automation: ReleaseX

- Allows users to automatically create all manufacturing files required for each vendor to which product data is supplied.
- Enables businesses to setup up vendor profiles that include contact information, pack and ship instructions, and a complete palette of design files that may be produced from Pantheon that may be included in the data profile.
- May be used to create and/or verify design files prior to release.
- If shipping instructions are included in the profile, design files will be electronically transferred when release package generation is complete.
- ReleaseX takes important steps to ensure that design files used in product QA are those which are released for product build.

Indx Key Features

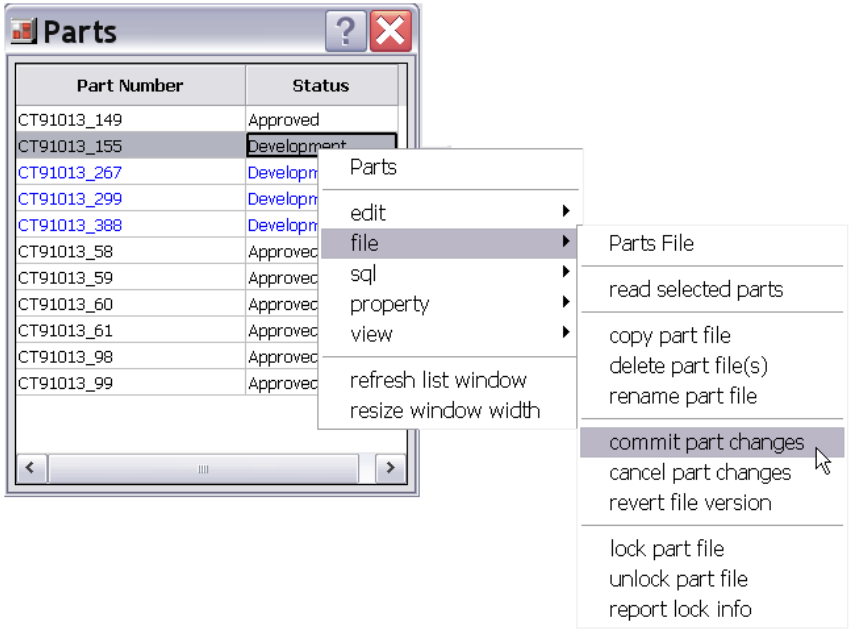


- Quick search & edit
- Geometry & Symbol Previews
- Batch edit properties
- Commit history, versioning
- Part, Symbol, Geometry Compare
- Fully customizable

INTERCEPT

Indx Key Features - Continued

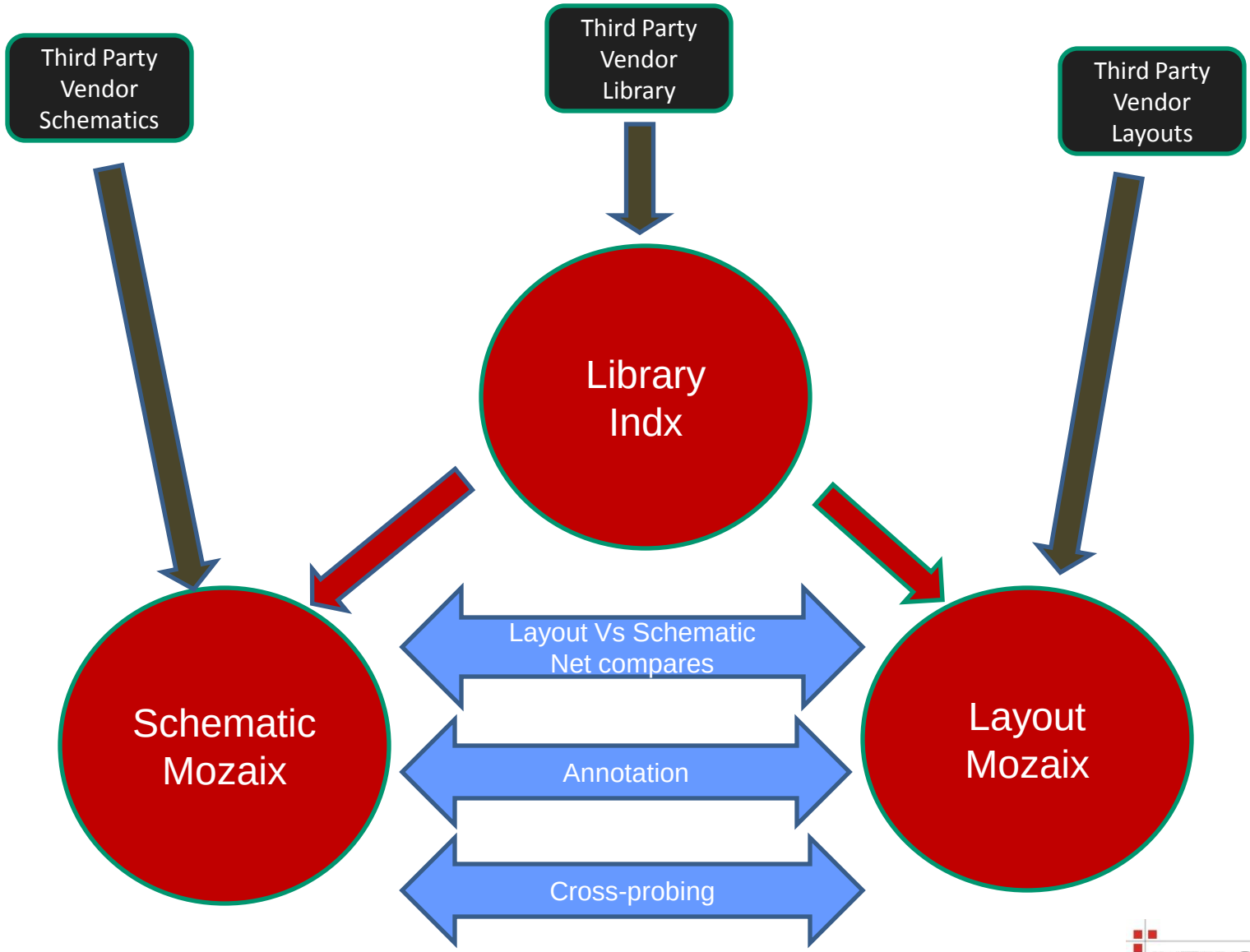
- Synchronize with external database system (SQL Server, Access, MySQL)
- One or more librarians can work in the same library



- Multiple approval levels for library objects
- Library objects are protected from users until it has met the proper approval level
- Full history of all changes made, as well as notes history from librarian commits.

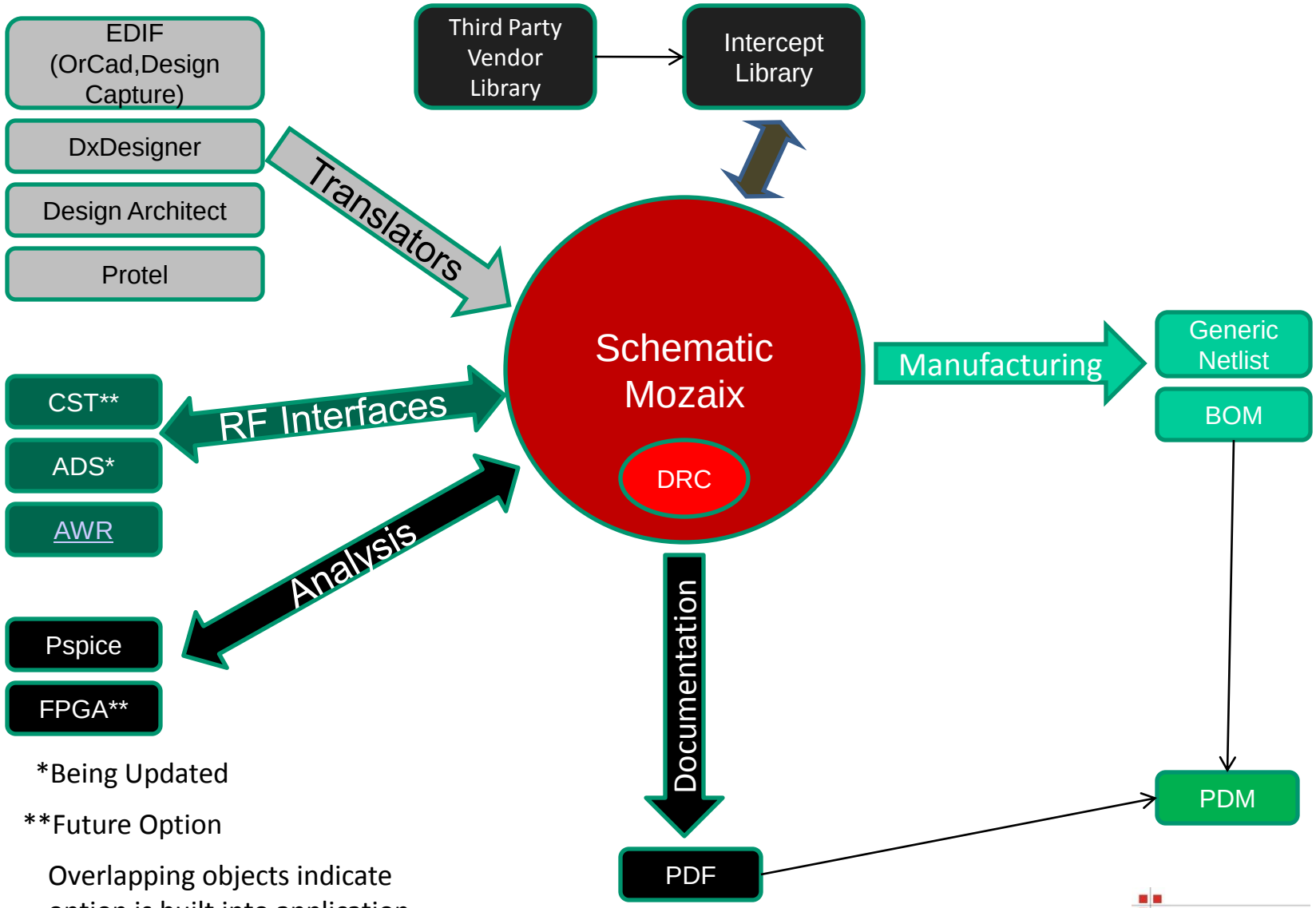
INTERCEPT

Intercept Migration Path



INTERCEPT

Schematic Migration Path

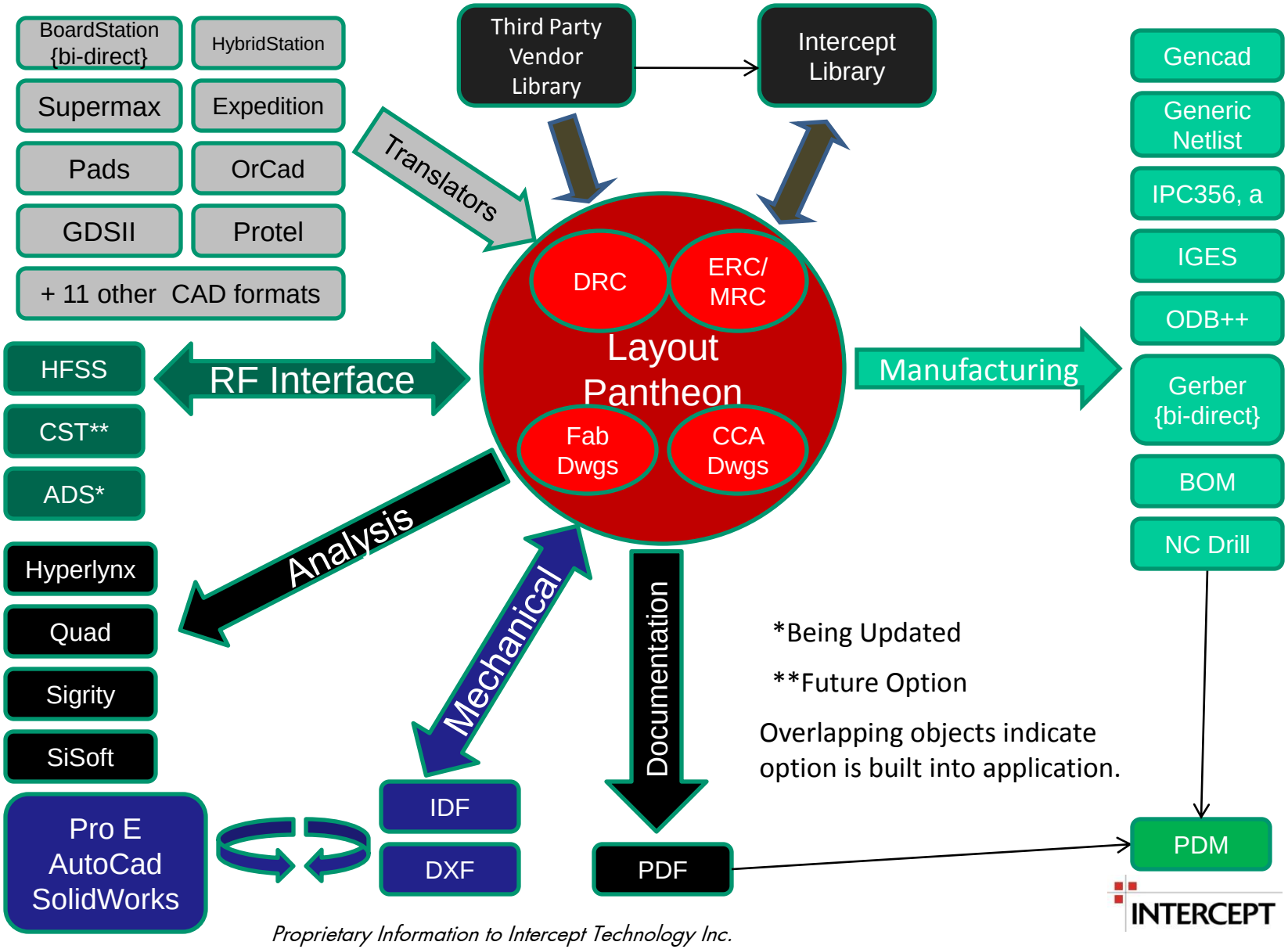


*Being Updated

**Future Option

Overlapping objects indicate option is built into application.

Layout Migration Path



Intercept Consulting Overview

Optimize Product Development Processes with Engineering Consulting Products and Services

- Leverage services to design an optimal concept-thru-manufacturing process
- **Develop specific process flow for conversion work and train staff**
- Benefit from automated design verification, release generation, and design archival products
- **Enable global library consolidation to a single library standard**
- ***Vast expertise in PERL and AMPLE***

Intercept – RF Leaders

AWR

ANSOFT
A subsidiary of ANSYS, Inc.

Agilent Technologies

Interfaces

Pantheon PCB/Hybrid /RF Layout

RF Features

- Bidirectional Simulation Interfaces
- Parametric Model Browser
- Route Parametric Comp: auto-converts primitive path to intelligent models.
- Layout-Driven Design
- Reverse Engineer a Schematic from layout with Palindrome
- Reuse Sections or Blocks
- Primitive to Intelligent Shape Conversion
- RF-specific DRCs

Mozaix Schematic

Indx Library

- High Speed Analysis Interfaces (SiSoft QSI, Hyperlynx, Quad XTK, Sigrity)
- Mechanical Interfaces (Pro E, IDF, DXF)
- Industry Standard Manufacturing and Artwork Outputs
- 35+ Schematic and Layout Translators

INTERCEPT

The RF Solution

- **Time and Cost Savings**

  Analysis and design processes simplified and shortened with full bidirectional interfaces.

- **200%+ Productivity Increase**

  Proven metrics: 8 week design cycle with other vendors shortened to 4 weeks with Intercept solution.

- **Primitive to Intelligent**

  Intelligent models and primitive shape-to-fill conversions means full benefit of Pantheon's design, electrical, artwork, and manufacturing checks.

"Designing such high-performance RF instruments requires very intricate PC board design. The Pantheon tool is well suited to these challenges and gives us the right amount of control over difficult geometries, which is vital to our designs."

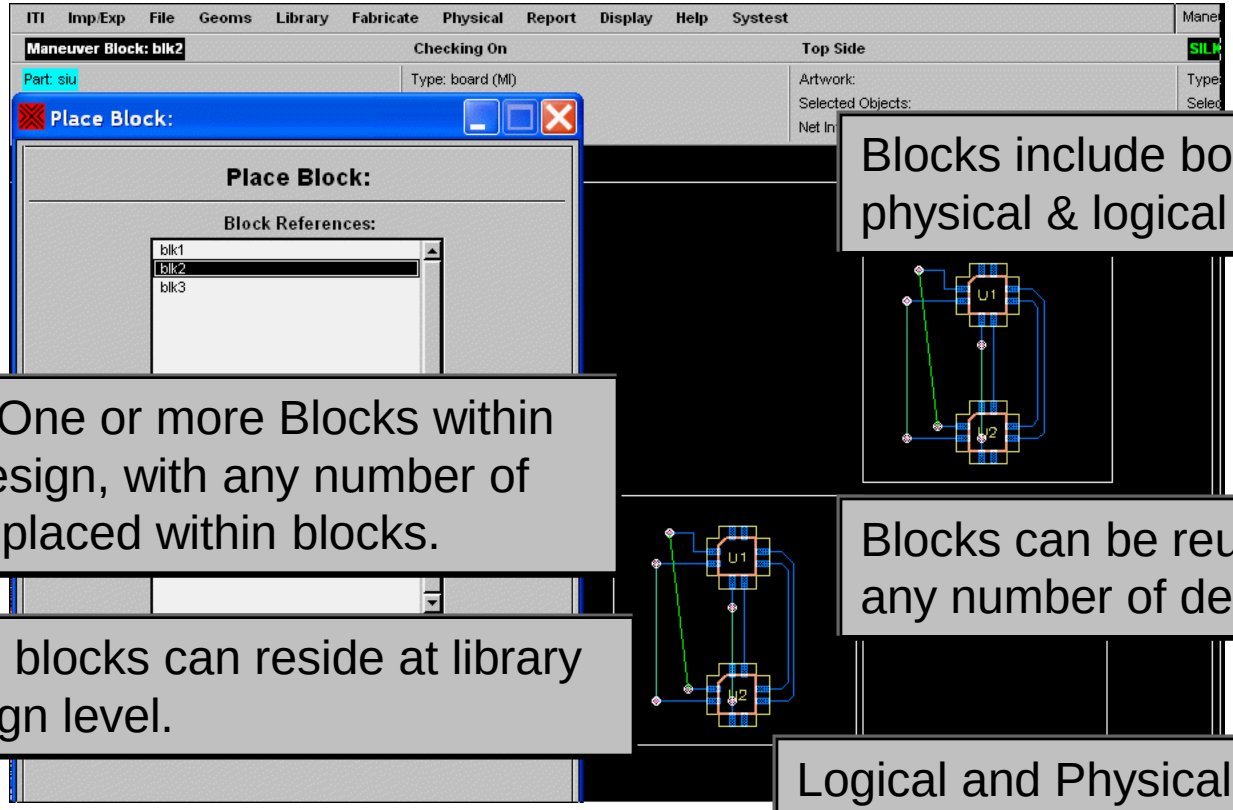
NATIONAL INSTRUMENTS

Jin Bains
R&D Manager
National Instruments

INTERCEPT

PCB/Hybrid/RF Design with Blocks

Schematic-Driven Design Block Technology Overview



Blocks include both physical & logical circuit

Utilize One or more Blocks within host design, with any number of blocks placed within blocks.

Blocks can be reused in any number of designs.

Design blocks can reside at library or design level.

Logical and Physical Reuse Blocks are Synchronized

INTERCEPT

PCB/Hybrid/RF Design with Blocks

Locked Blocks

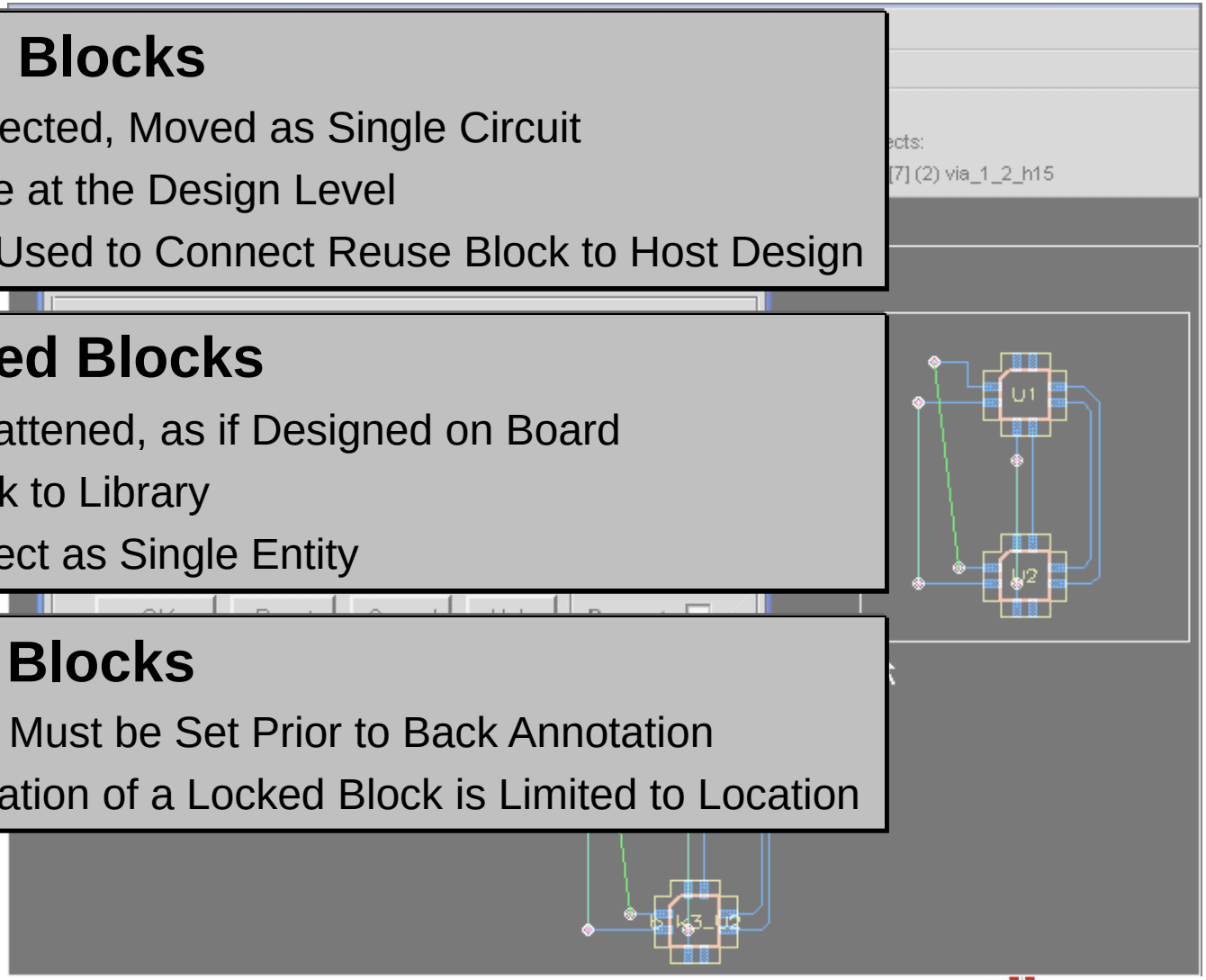
- Placed, Selected, Moved as Single Circuit
- Not Editable at the Design Level
- Block Pins Used to Connect Reuse Block to Host Design

Unlocked Blocks

- Circuit is Flattened, as if Designed on Board
- No link Back to Library
- Cannot Select as Single Entity

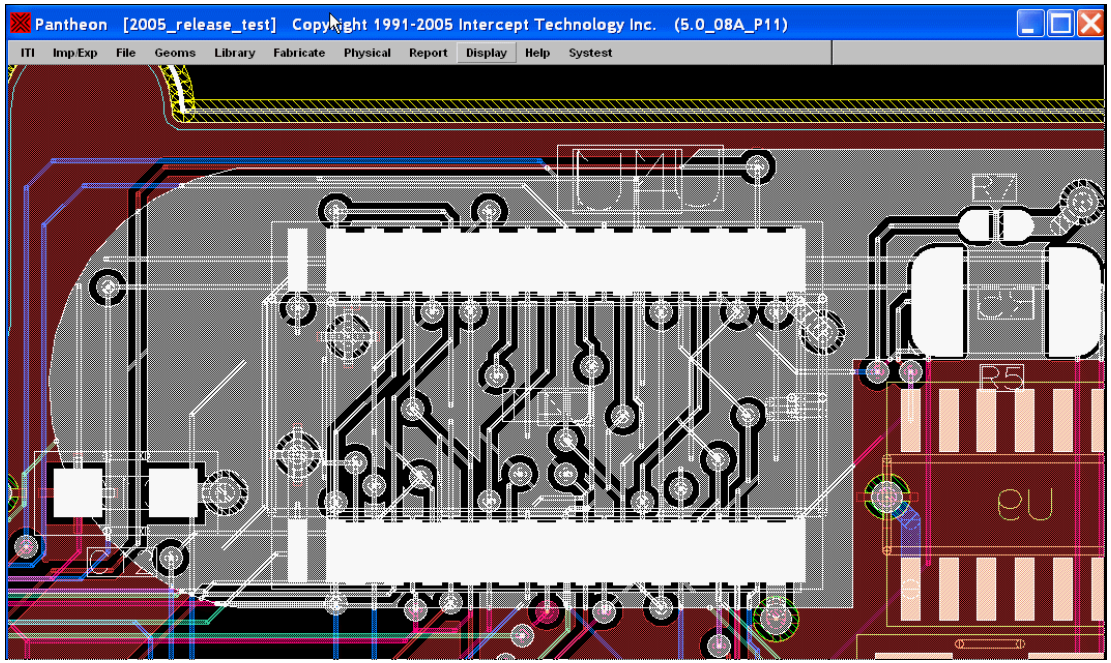
Mozaix Blocks

- Block State Must be Set Prior to Back Annotation
- Back Annotation of a Locked Block is Limited to Location



PCB/Hybrid/RF Design Reuse with Sections

Define Section – Copy, Write, Maneuver



Multi-Point Section

Dedicated Section Menu

INTERCEPT

PCB/Hybrid/RF Design Reuse with Sections

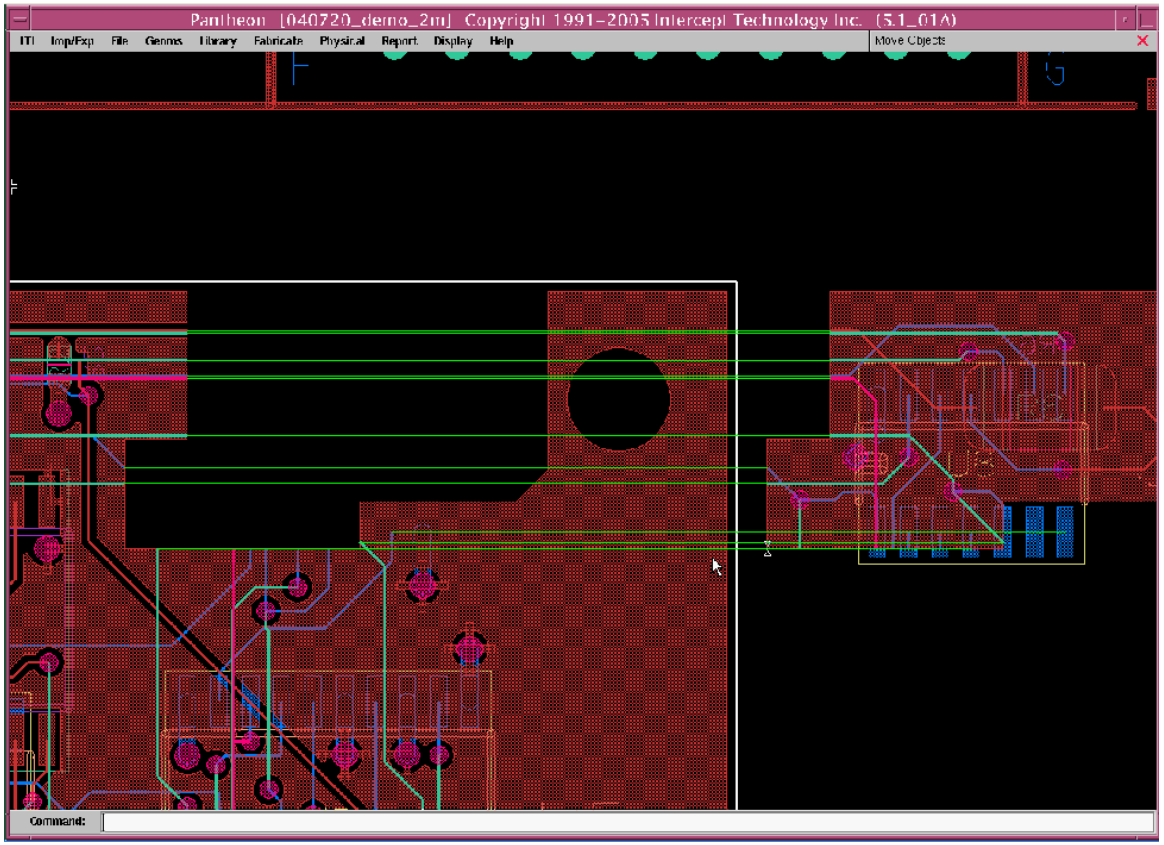
Copy

Move

Rotate

Maneuver

Flip



INTERCEPT

PCB/Hybrid/RF Design Reuse with Sections

Unmatched layout-driven design technology for a 100% complete intelligent design database – *without the need for a schematic*.

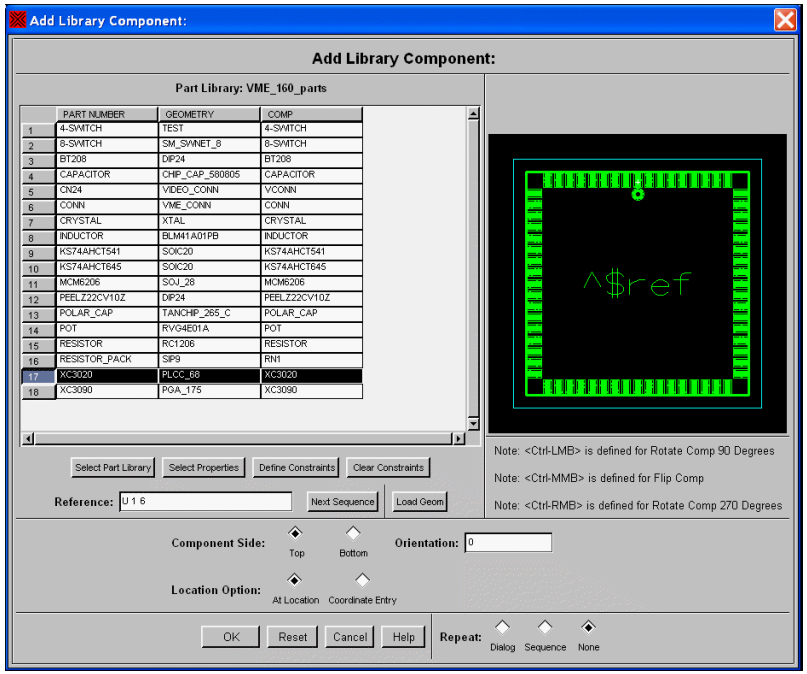
Create/Add Components

Add/Merge/Split Nets

Add (Paste)/Copy Section

Use Sections In Same or Alternate Designs

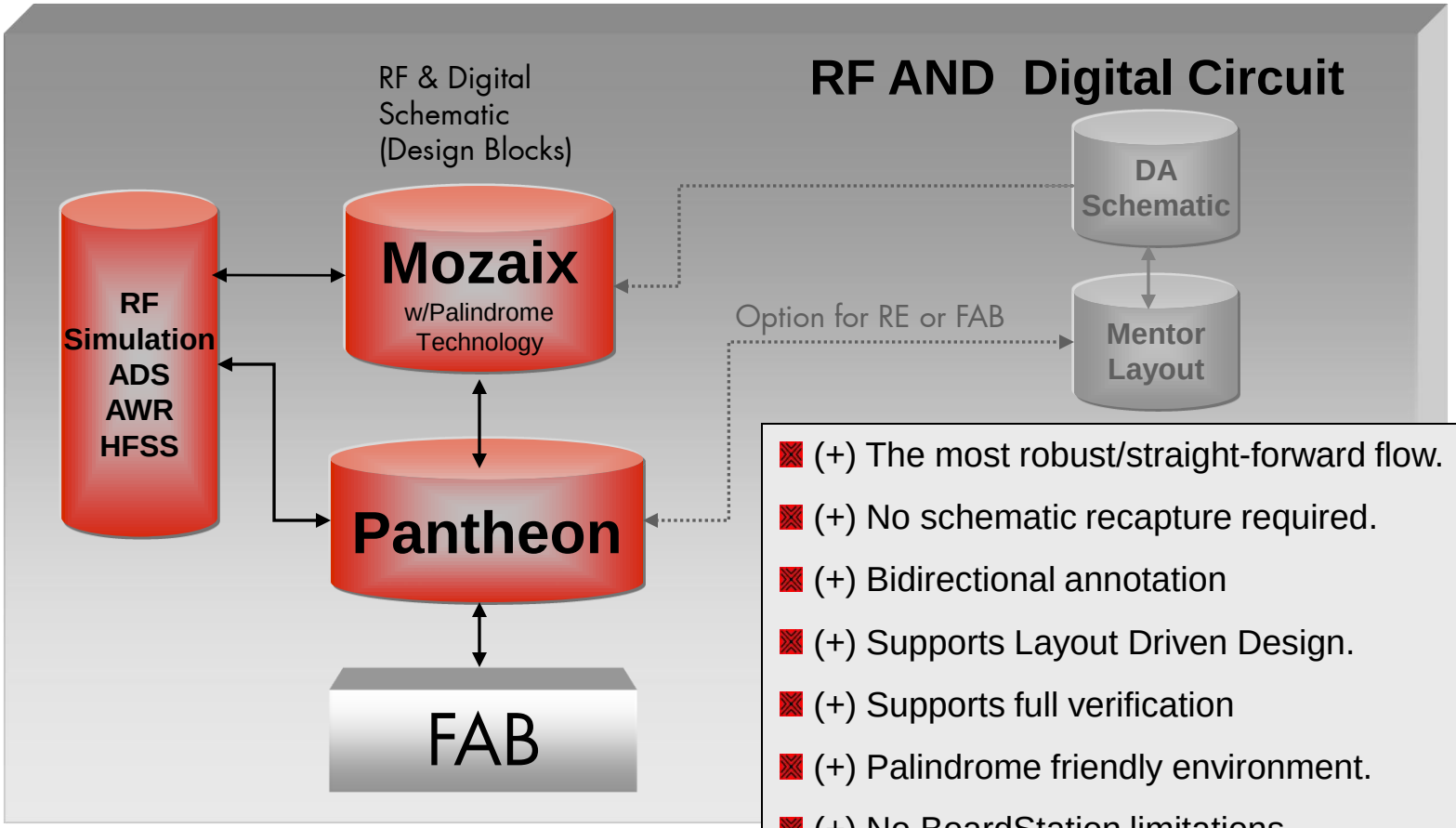
Combine **RF** + **Digital** Library Parts & Associated Flows



INTERCEPT

Flexibility

Design Flow – Intercept RF & Digital

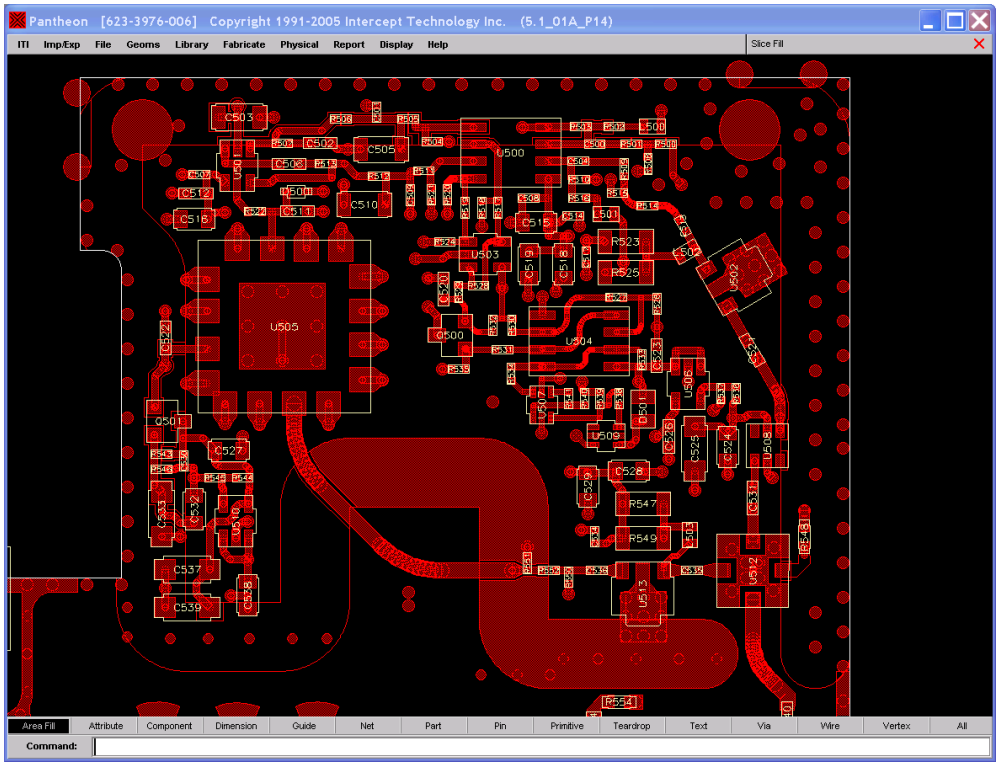


- (+) The most robust/straight-forward flow.
- (+) No schematic recapture required.
- (+) Bidirectional annotation
- (+) Supports Layout Driven Design.
- (+) Supports full verification
- (+) Palindrome friendly environment.
- (+) No BoardStation limitations

RF Design

Shape/Fill Manipulation

Easily create and manipulate complex copper and arbitrary shapes.



- Slice/Merge
- Chamfer
- Cutouts
- Grow/Shrink
- Add/Move Vertex

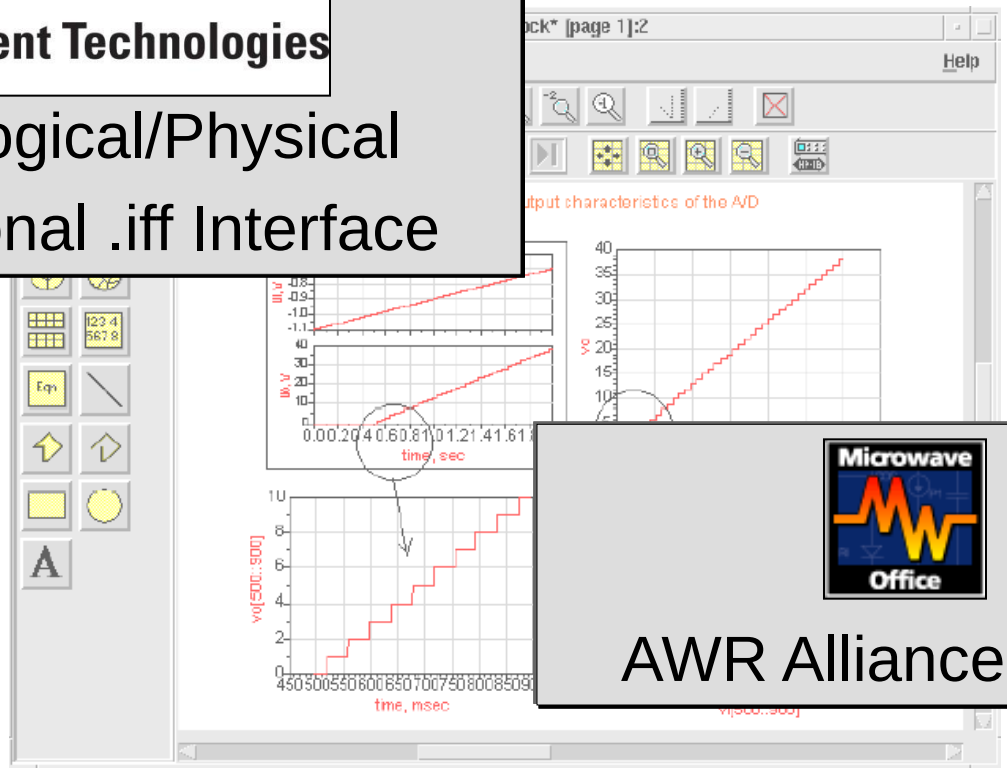
INTERCEPT

Industry Standard Simulation Options

Agilent Technologies

ADS – Logical/Physical

Bidirectional .iff Interface



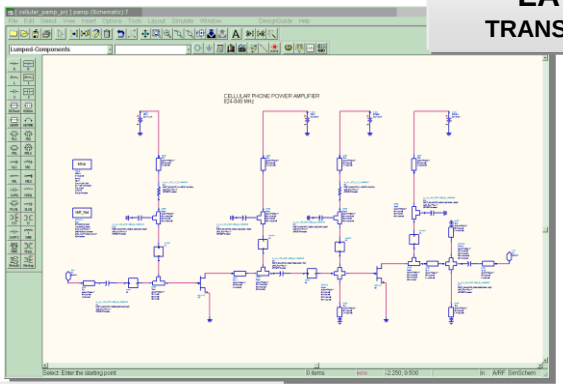
Microwave Office

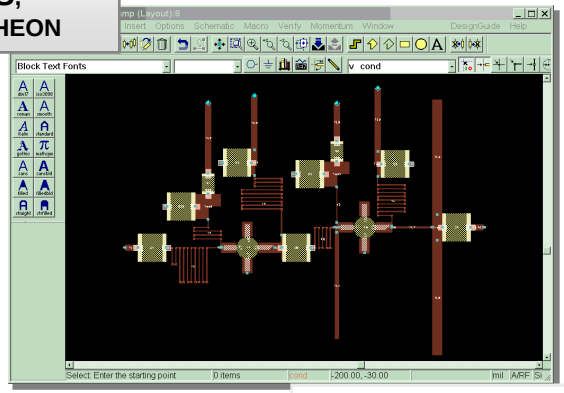
AWR Alliance Program

RF Design

Simulation

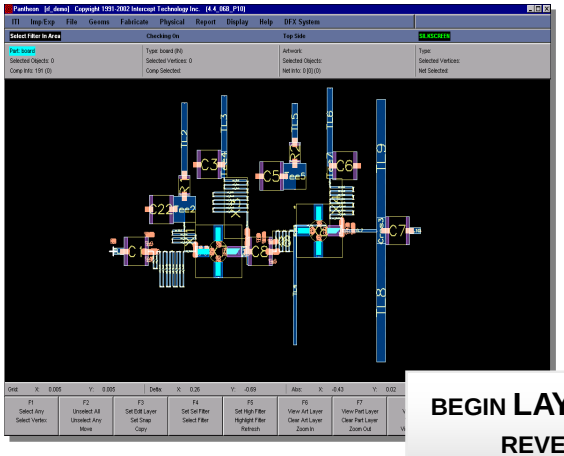
BEGIN **SCHEMATIC** IN **ADS**,
LAYOUT IN **ADS**,
TRANSFER TO **PANTHEON**

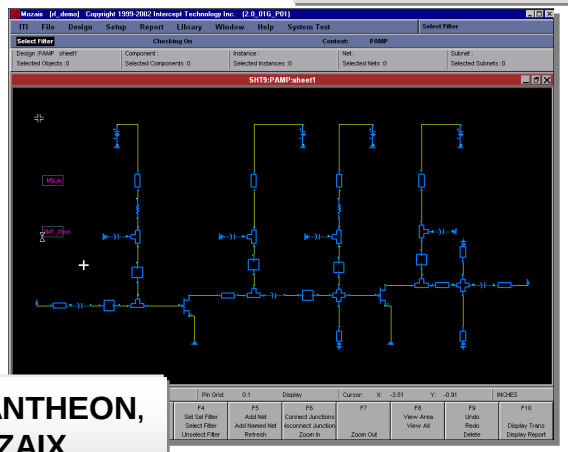




BEGIN **SCHEMATIC** IN **ADS**,
TRANSFER TO **MOZAIX**,
F/A TO **PANTHEON**

BEGIN **LAYOUT** IN **ADS**,
TRANSFER TO **PANTHEON**,
BACK ANNOTATE TO **ADS**

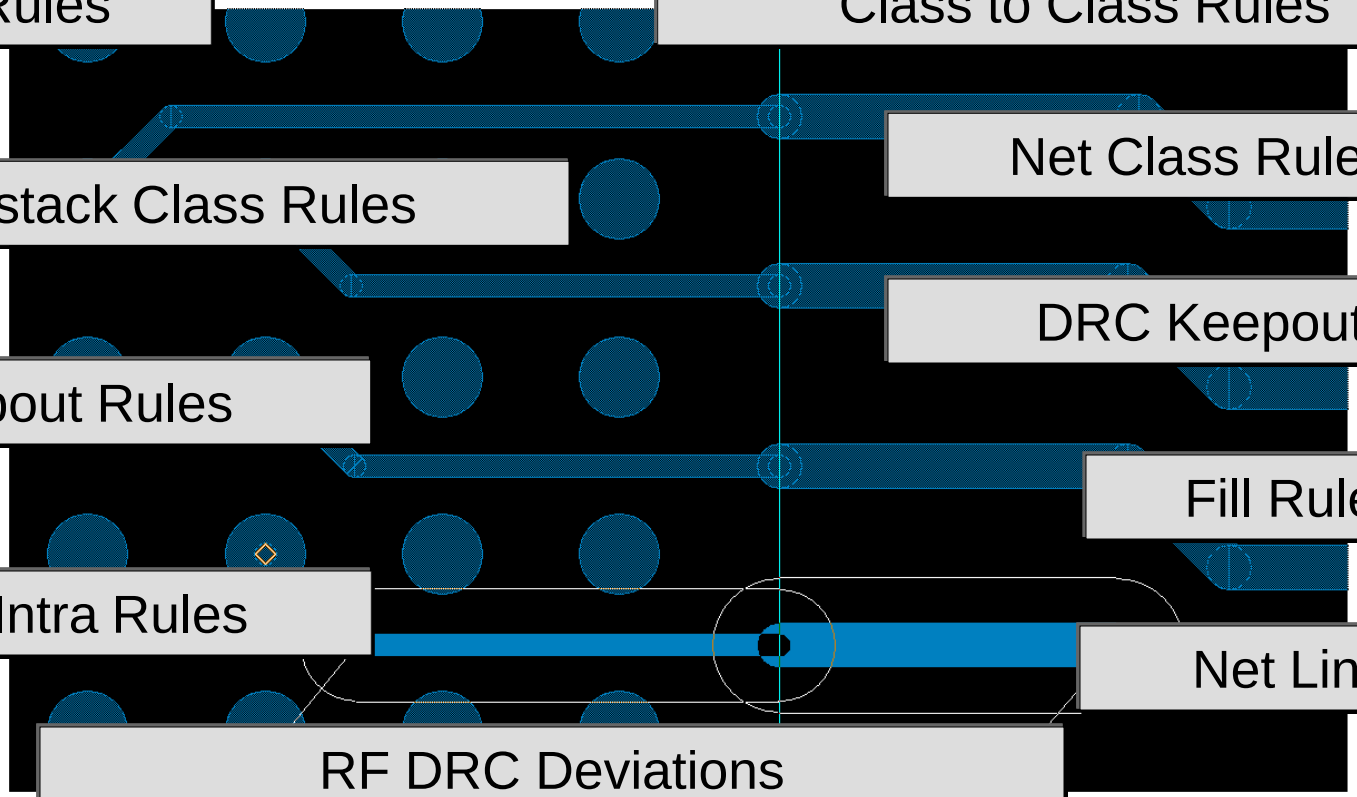




BEGIN **LAYOUT** IN **PANTHEON**,
REVERSE TO **MOZAIX**,
BACK ANNOTATE TO **ADS**

INTERCEPT

Pantheon DRC Capabilities

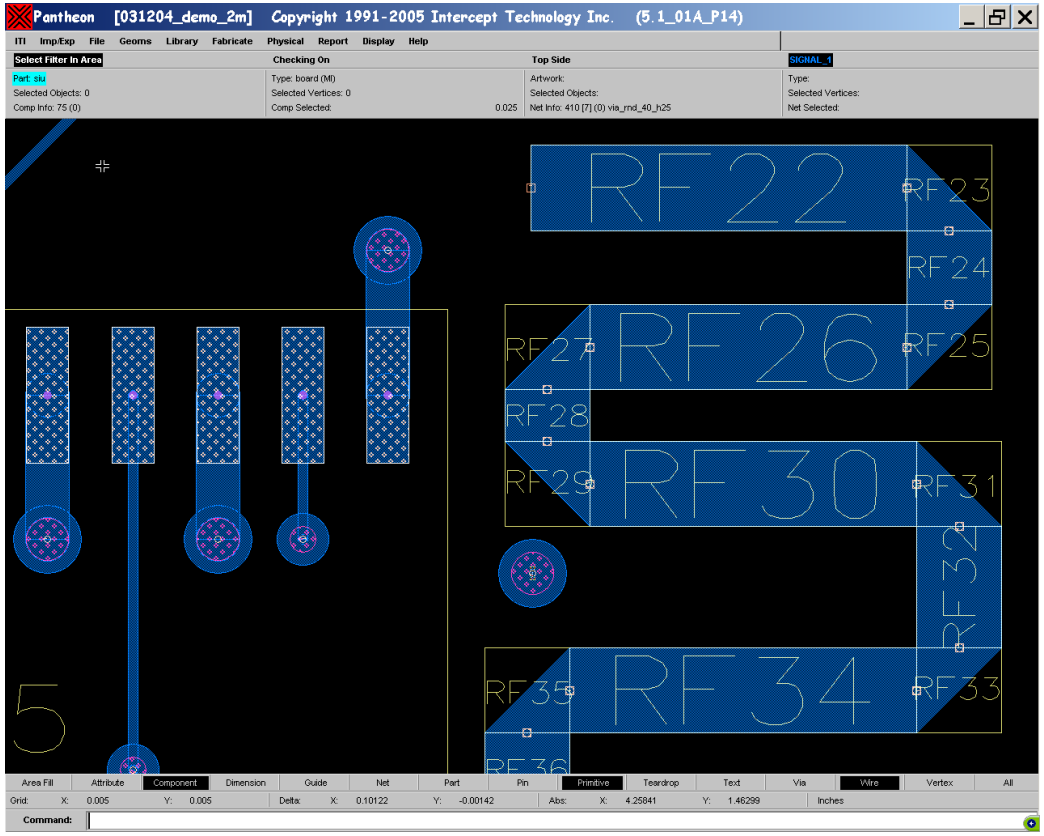


- Area Rules
- Class to Class Rules
- Net Class Rules
- Padstack Class Rules
- DRC Keepout
- Keepout Rules
- Fill Rules
- Inter/Intra Rules
- Net Link
- RF DRC Deviations (Allow RF Component Overlap/Short)

RF Design

Pantheon-Exclusive Capabilities

Route Parametric Component: Converts a routed path to RF models



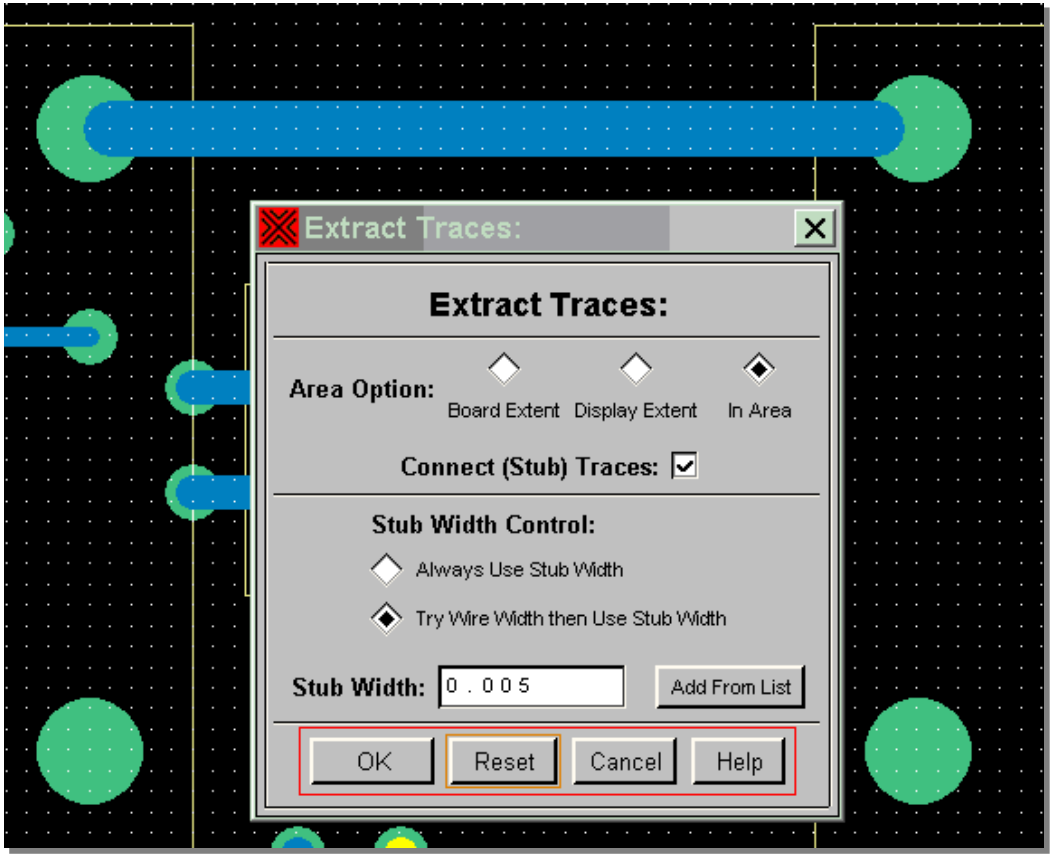
Stripline

Microstrip

ADS or MWO

INTERCEPT

Extract Traces: Convert Primitive Shapes to Intelligent Objects



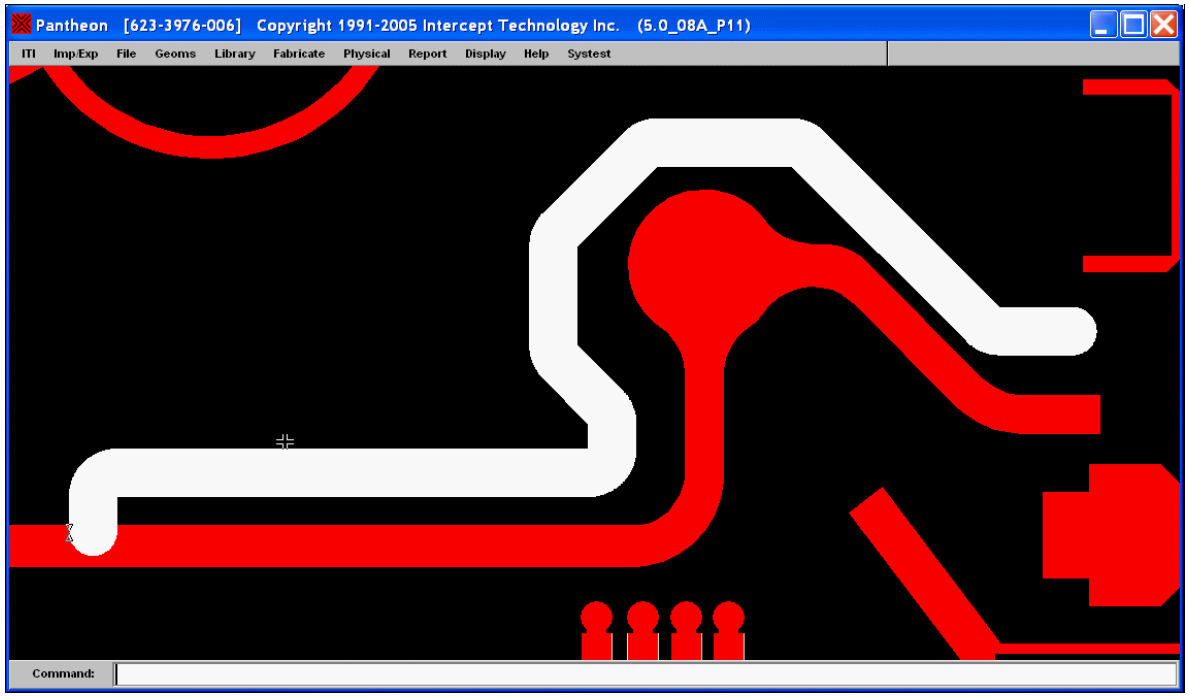
- DXF Imports
- Polygons
- Circles
- Paths

INTERCEPT

RF Design

Pantheon-Exclusive Capabilities

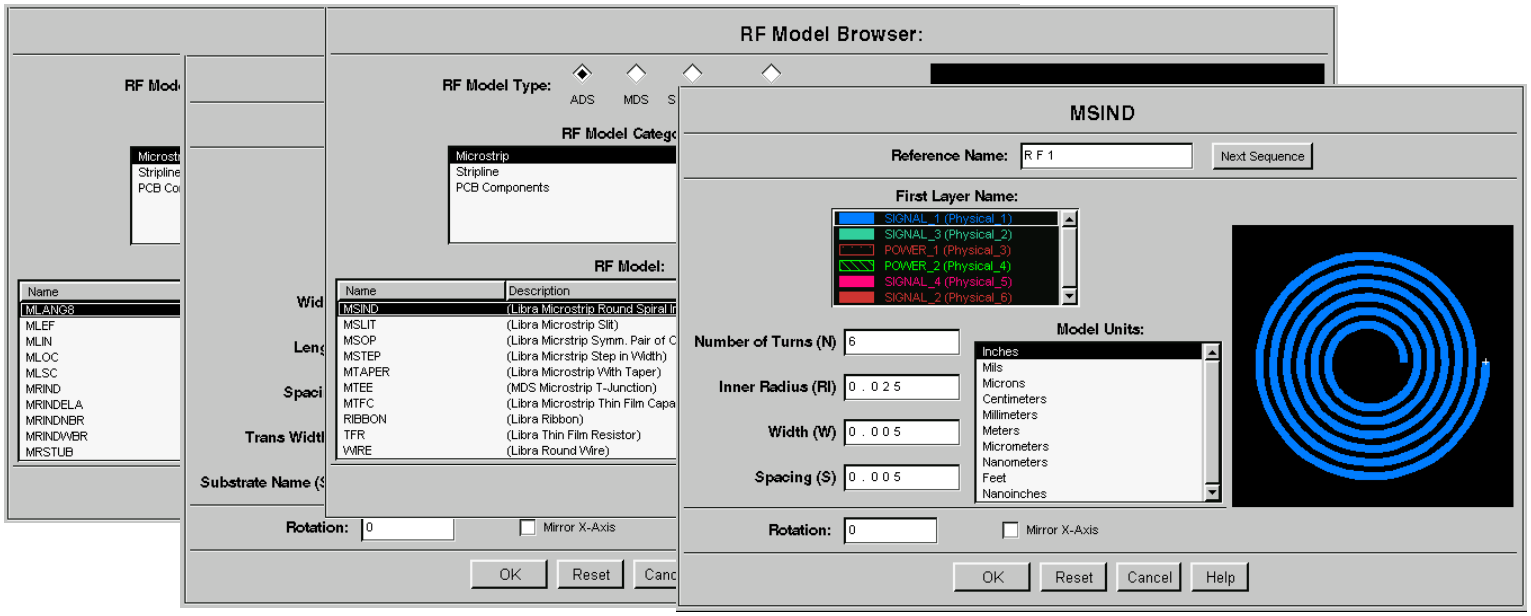
Route Fill - Intelligent Paths - Multi Fill



- Modify
- Move
- Copy
- Reuse as any circuit item

INTERCEPT

Parametric RF Model Generator



- Combine RF with analog and digital on the same board
- Transfer data bi-directional to HP EEsof's ADS, MDS, and MWO
- Supports schematic or layout driven design flows
- Eliminate the need to re-draw RF shapes
- Form complex and specialized RF components directly from dialog boxes
- Create Parameterized RF shapes

Intercept Technology – RF Summary

Dedication to RF Market & Technology

Intercept is 100% dedicated to the RF Market – now and into the future

- Intercept has been an established RF Design solutions leader since 1997.
- A leading supplier of RF installations in North America
- Intercept exclusive RF features:
  - Database *Structured* for RF Design
  - Route Parametric Component
  - Layout-Driven Design
  - Parametric ADS/MWO Model Browser
  - Primitive Shape Conversion
- Committed to utilizing all industry standard RF simulation engines.
- Proven history of mixed signal RF/Digital design capabilities – ITI Strength.

Indx

Next Generation Library Management Software

INTERCEPT

Basic Indx Features

- Real-Time Status Display
- Batch Edit Properties on the Fly
- Symbol and Geometry Preview
- Commit History, Versioning
- Fully Customizable

Indx 4.1_03A_P56 [Libraries]

File Edit View Settings DRCs Libraries Help

Library * PART_NUMBER 785* Max Results 10

Modified Parts: 19(2)(1)(6) Modified Symbols: 0 Modified Geometries: 0 Commit Changes to Library

Parts Symbols Geometries Designs

<Internal>
capacitor_fixed
connector_elec
ic_analog
ic_digital
ic_memory
ic_microproc
mag_emi
mag_inductor
mag_xfmr
other_audio
other_fiber_optic
other_freq_gen
other_fuse
other_opto
other_pur_assys
other_relay
other_switch
resistor_discrete
resistor_pot
semicond_curr_reg
semicond_diode
semicond_protect
semicond_xstr
xtra_board_parts

Library Part List | Library Symbol List

Reset Filters Refresh Properties Displ

State	Library	Status	Part Class	P
ID*	ic_digital	Development	digital	78
ID*	ic_digital	QA-Fail	digital	785
ID*	ic_digital	Approved	digital	785-00010
ID*	ic_digital	Development	digital	785-00011
ID*	ic_digital	Approved	digital	785-00012
ID*	ic_digital	Approved	digital	785-00013
ID*	ic_digital	Approved	digital	785-00015
ID*	ic_digital	Approved	digital	785-00016
ID*	ic_digital	Approved	digital	785-00018
D	ic_digital	inactive	digital	785-00024
D	ic_digital	inactive	digital	
D	ic_digital	inactive	digital	
D	ic_digital	inactive	digital	
ID*	ic_digital	Obsolete	digital	
ID*	ic_digital	Obsolete	digital	
ID*	ic_digital	Obsolete	digital	
ID*	ic_digital	Inactive	digital	
ID*	ic_digital	Inactive	digital	
ID*	ic_digital	Inactive	digital	
ID*	ic_digital	Inactive	digital	
ID*	ic_digital	Inactive	digital	
ID*	ic_digital	Inactive	digital	

Copy
Paste
Edit Multiple
Sequence Items
Add Property
Remove Property
Change Property Name
Edit Part
Edit Symbol
Check Parts

1 of 4

Geometry Preview

1 of 1

BGA665_50MIL DRAWING

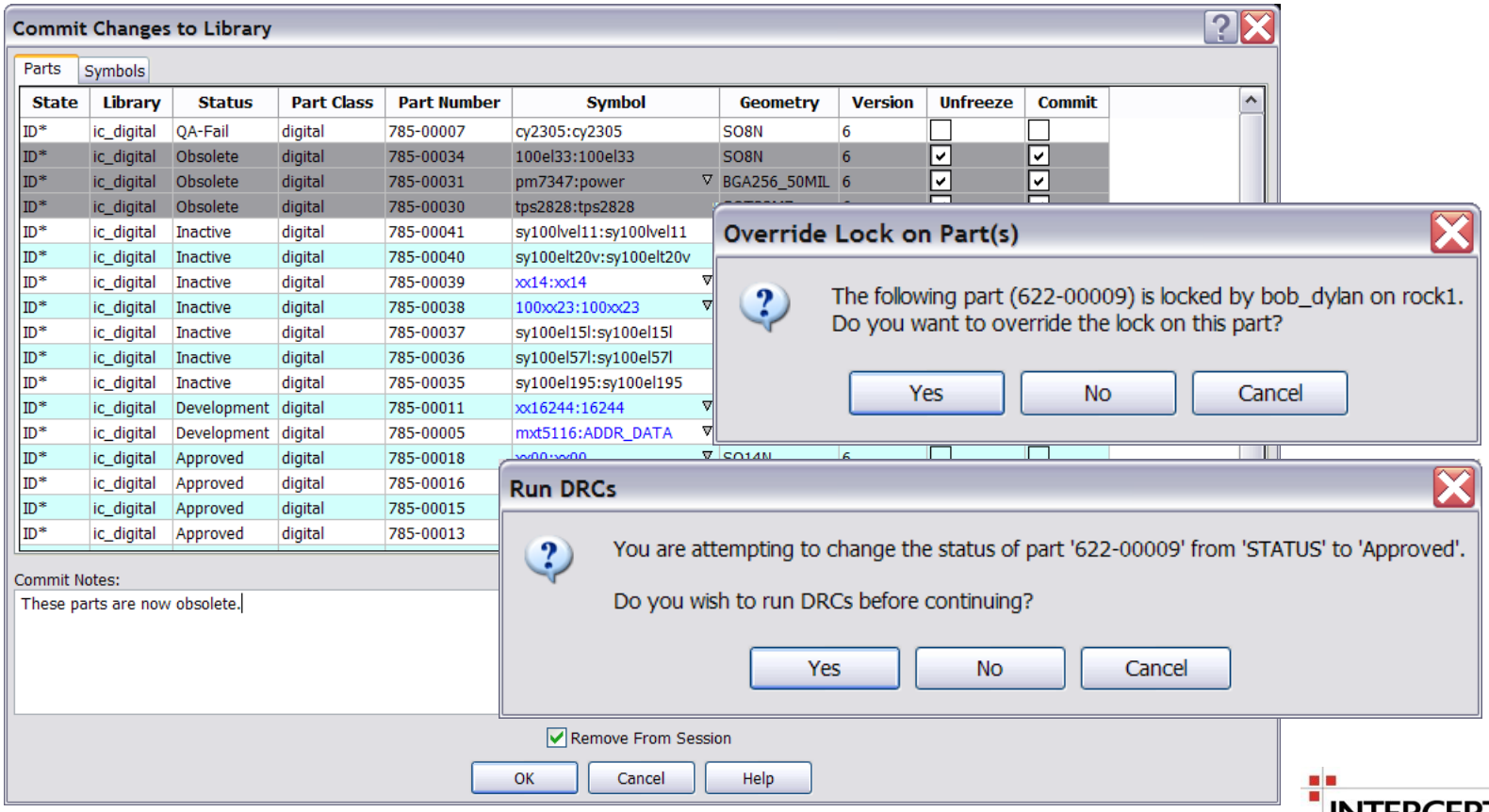
Command:

Checking Auto Edit

INTERCEPT

Advanced Indx Features

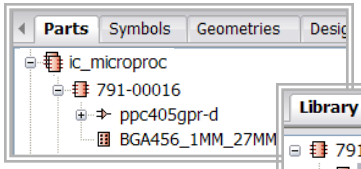
- One or more librarians can work in the same library
- Multiple approval levels for library objects
- Library objects are protected from users until they are approved
- Full history of all changes made, as well as notes history from librarian commits
- Synchronize with external database system (SQL Server, MySQL)



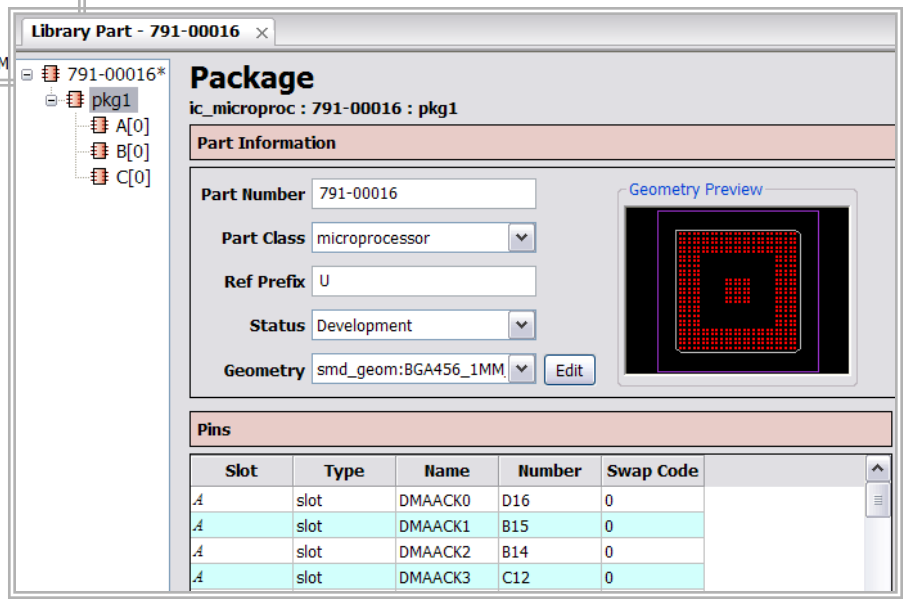
INTERCEPT

Intercept Parts: Auto-Packaging on the Fly

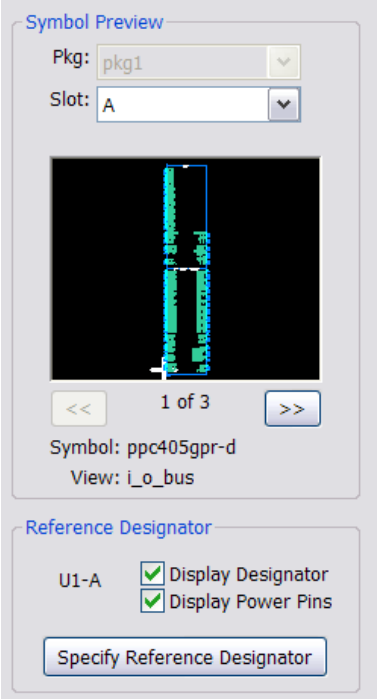
- Parts contain live, DRC-able references to their symbol(s) and geometry(ies).
- Intercept part information includes complete packaging information
- Fully packaged parts = faster placement on the schematic using auto-packaging.
- Placing parts is a one step process.



Indx Project Explorer



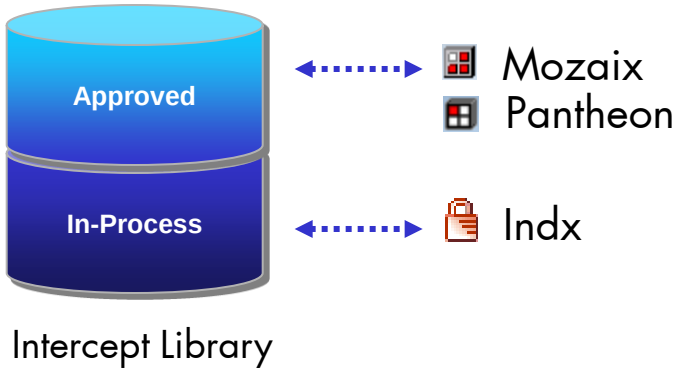
Indx Part Editor View



Mozaix Add Part Auto-Packager

INTERCEPT

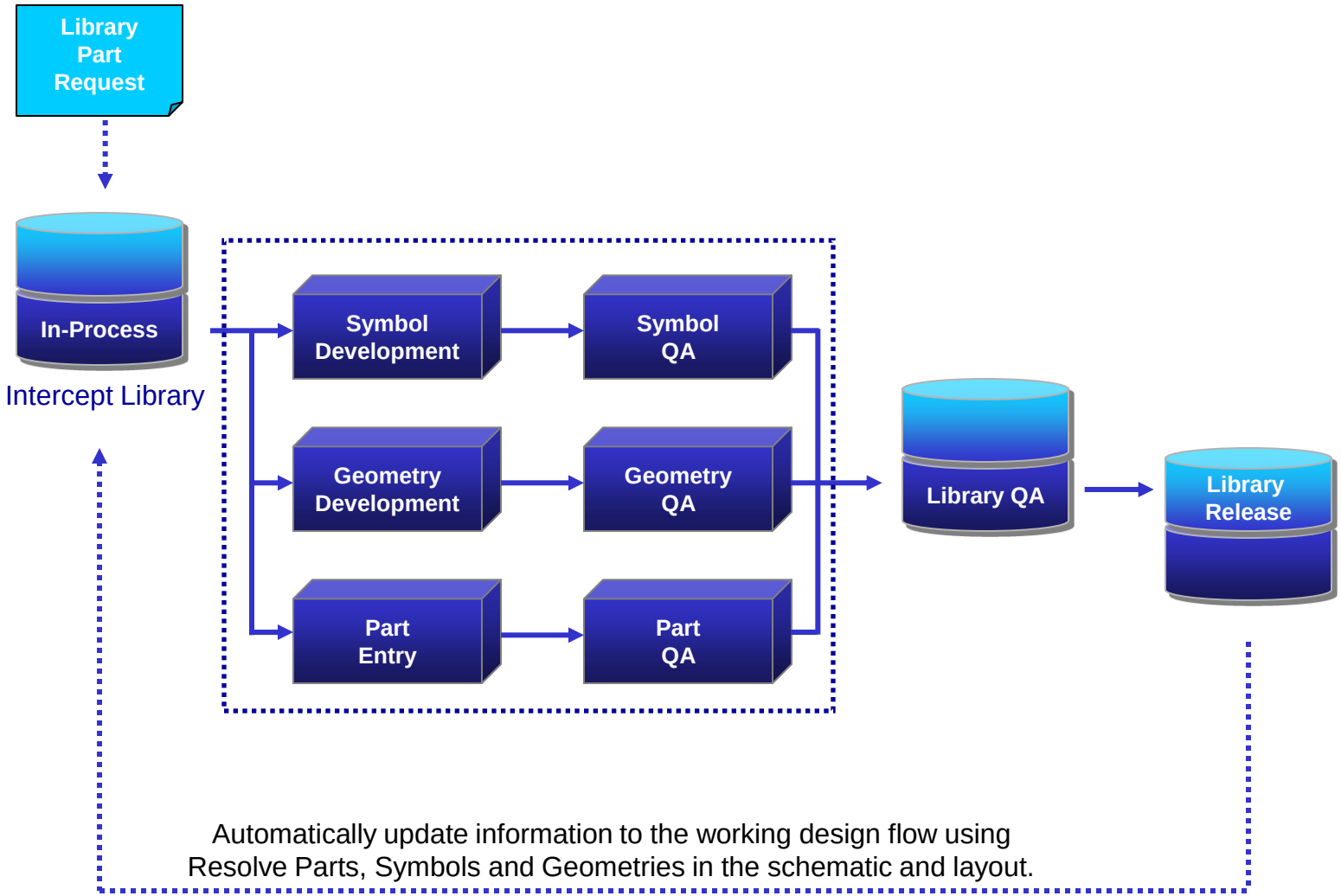
Intercept Edit-in-Place Library Flow



- "Development" parts, symbols, and geometries stored at same location as "Released" parts.
- Librarian checks out the object, which leaves the last known version active.
- Mozaix/Pantheon users are warned when using a library object that is actively being edited by a Librarian. Design work continues using last active version.
- Any librarian commits are inaccessible to users until Librarian "unlocks," or "releases" the new part, symbol, or geometry version.
- Upon running batch DRCs in Mozaix & Pantheon, users are notified that a newer version of the part, symbol or geometry is now available.
- Automatic Update or Library Resolve synchronizes schematic/layout with updated library objects.

INTERCEPT

Intercept Part Request Flow

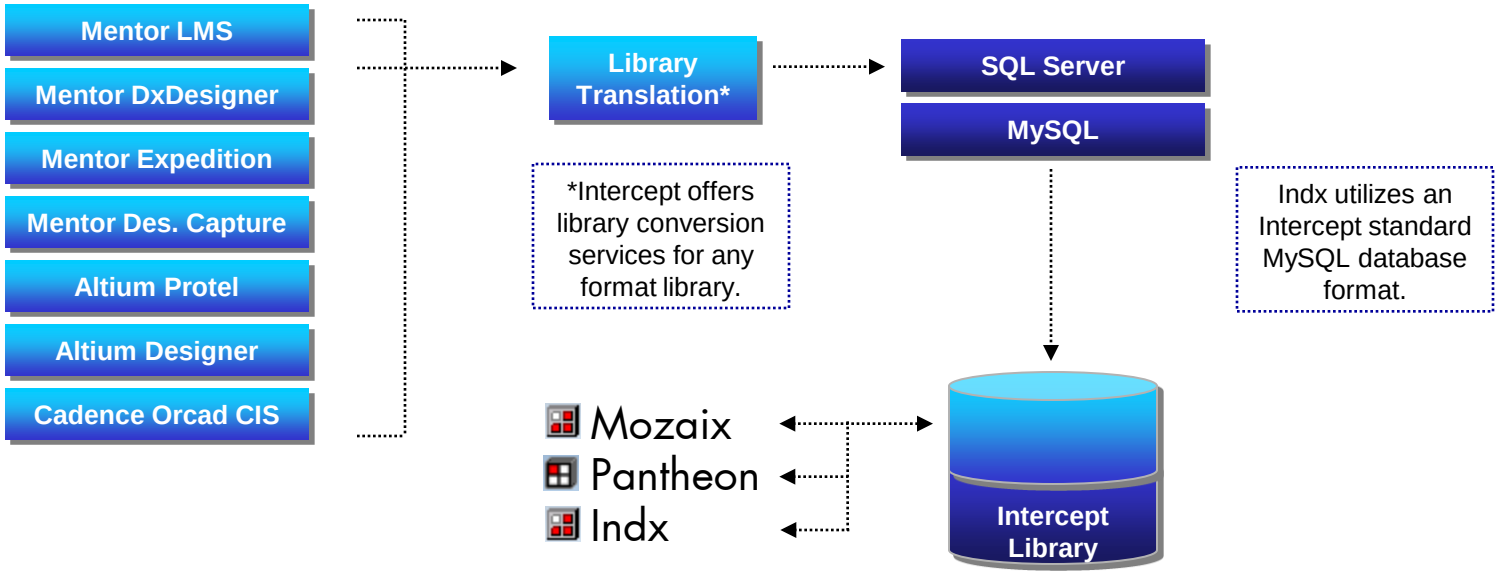


INTERCEPT

Library Migration Flow

Legacy libraries are converted to Intercept format in a one time translation.

This allows full migration to Intercept products.



- Create and edit database parts in Indx
- Finalize and check parts, symbols, geometries
- Commit data for use in Mozaix and Pantheon

INTERCEPT

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INTERCEPT

www.intercept.com