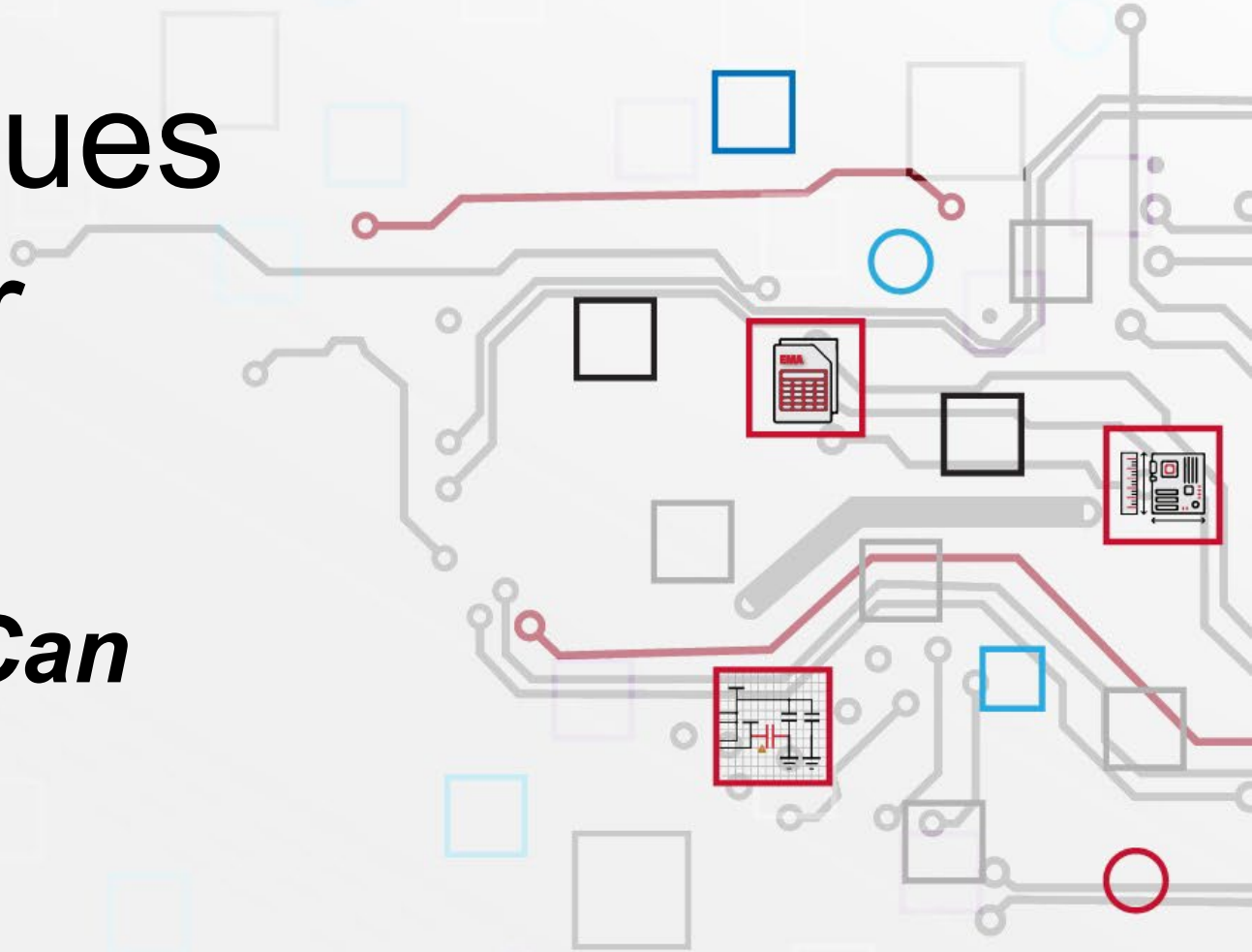
EMA Design Automation

WEBINAR

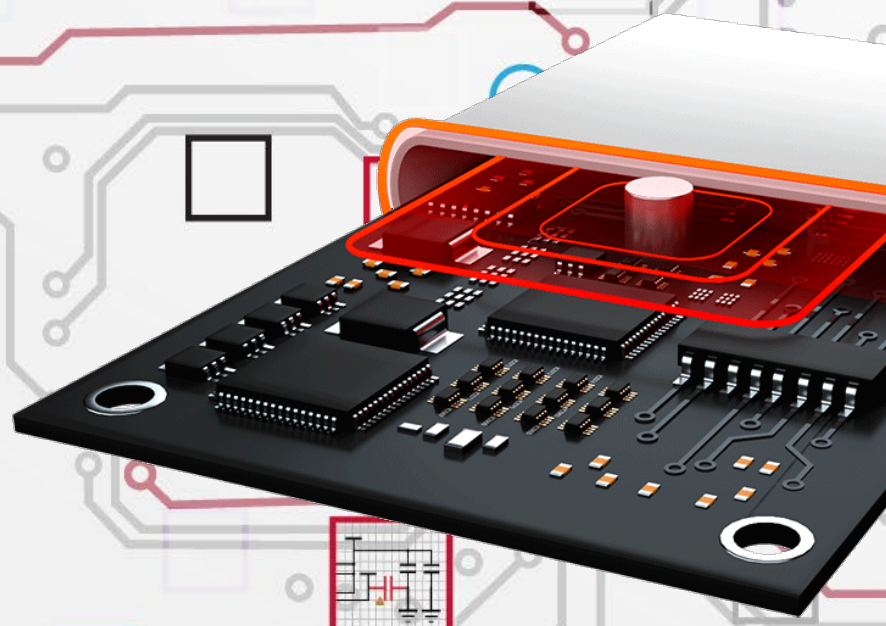
6 Common Issues Lurking in Your PCBs

And How OrCAD X Can Solve Them



Agenda

- Into
- OrCAD X Intro
- Cost of Change over Time
- 5 Items
- AI Sneak Peak
- Q&A



EMA Design Automation™

Your Trusted Design Partner

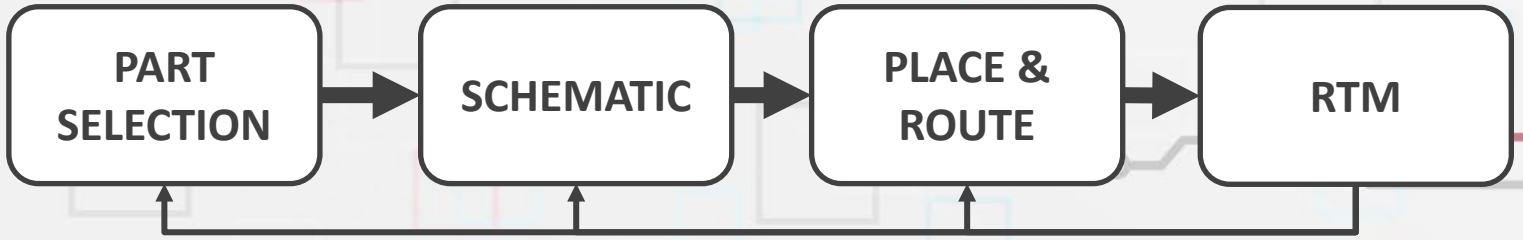
- Support
- Services
- Software
- Training

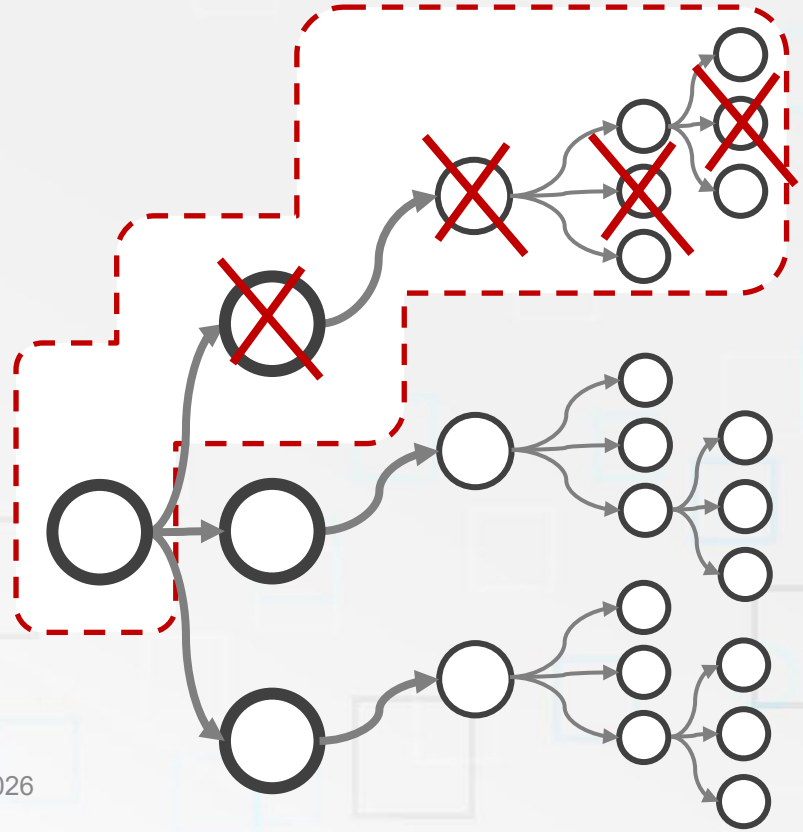
Over 30 years experience helping engineers design, validate, and build hardware successfully

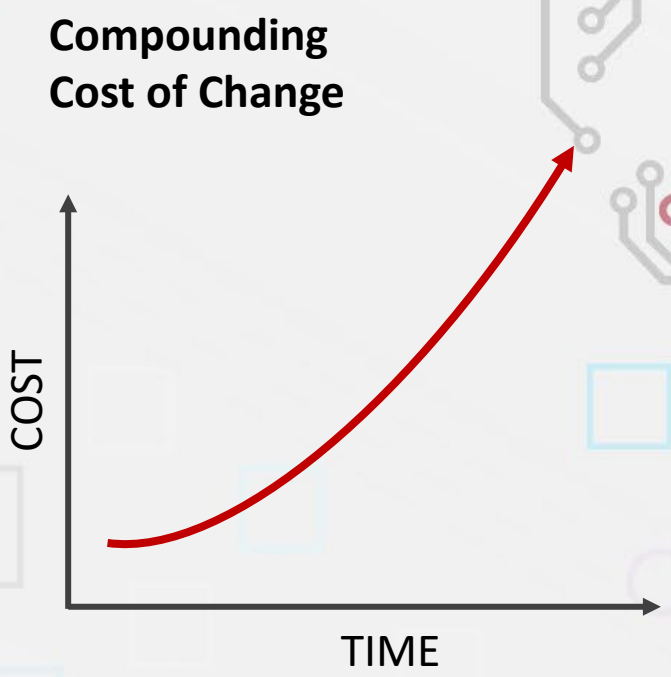
cadence®
CHANNEL PARTNER

SIMPLIFIED

PCB Design Flow







- Cost of Change Increases as Design Progresses
- Cumulative Effect of Changes (decisions stack)
- Identify and Resolve Early is Key

ISSUE 1/6

Part Selection

Problems

- Supply chain issues with selected parts
- Choosing the right parts upfront is key
- Not only electrical / functional compatibility but supply chain / sourcing needs to be considered too
- Late stage charges are typically the most costly

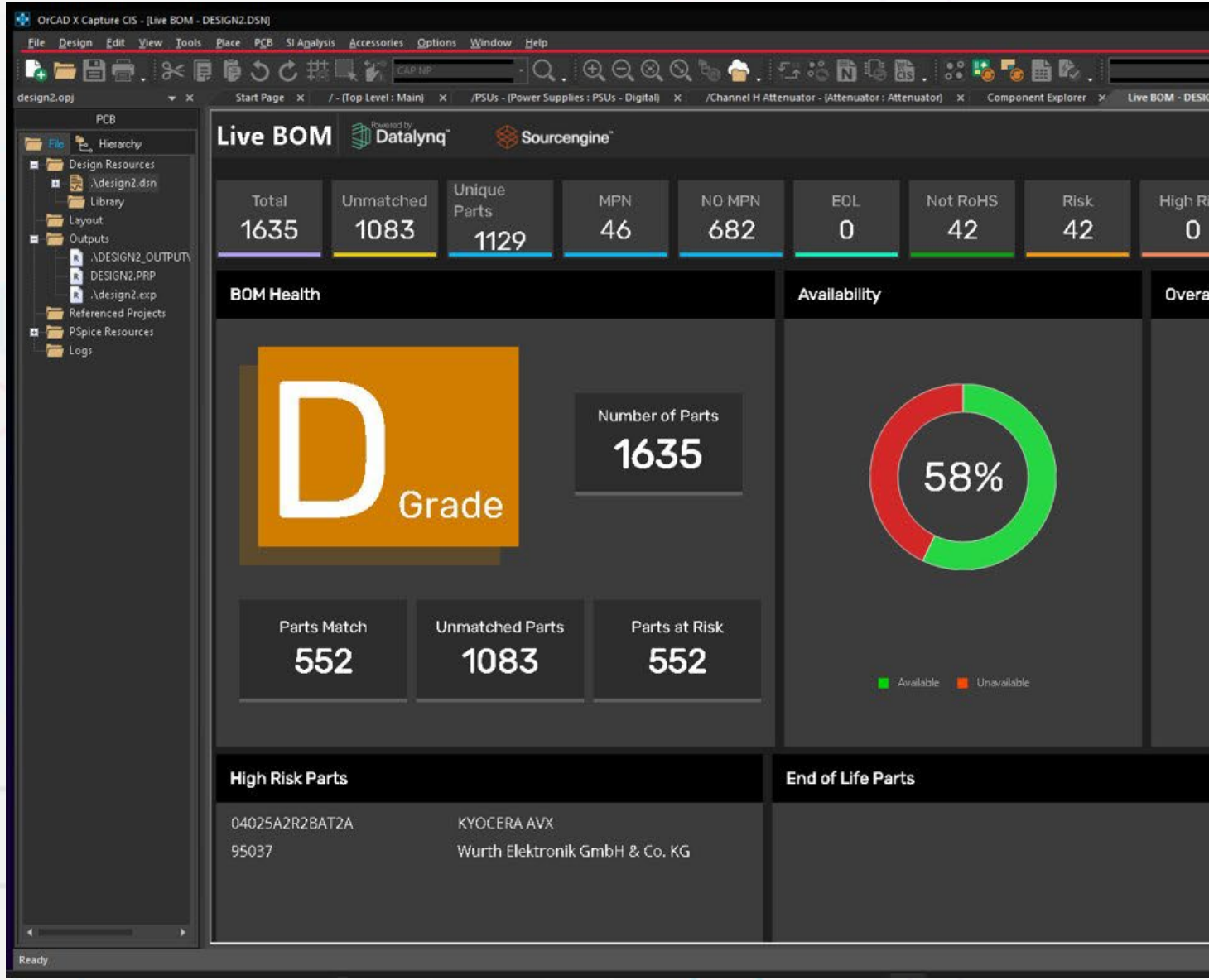
	MPN	Supplier	Description	Avg. Price
	C0402C102J5GACTU	KEMET CORPORATION	Cap Ceramic 0.001uF 50V C0G 5% Pad SMD 0402 125°C T/R	**$0.02**
	CL05C102JB5NNND	SAMSUNG ELECTRO-MECHANICS	Cap Ceramic 0.001uF 50V C0G 5% Pad SMD 0402 125°C T/R	**$0.02**
	GRM1555C1H102JA01B	MURATA MANUFACTURING	Cap Ceramic 0.001uF 50V C0G 5% Pad SMD 0402 125°C Bulk	**$0.01**
	C0402C102J5GACAUTO	KEMET CORPORATION	Cap Ceramic 0.001uF 50V C0G 5% Pad SMD 0402 125°C Automotive T/R	**$0.05**

	MPN	Supplier	Description	Avg. Price	Min. Lead Time [Week(s)]	Max. Lead Time [Week(s)]
	C0402C102J5GACTU	KEMET CORPORATION	Cap Ceramic 0.001uF 50V C0G 5% Pad SMD 0402 125°C T/R	**$0.02**	**54**	**54**
	CL05C102JB5NNND	SAMSUNG ELECTRO-MECHANICS	Cap Ceramic 0.001uF 50V C0G 5% Pad SMD 0402 125°C T/R	**$0.02**	**24**	**24**
	GRM1555C1H102JA01B	MURATA MANUFACTURING	Cap Ceramic 0.001uF 50V C0G 5% Pad SMD 0402 125°C Bulk	**$0.01**	**Obsolete**	**Obsolete**
	C0402C102J5GACAUTO	KEMET CORPORATION	Cap Ceramic 0.001uF 50V C0G 5% Pad SMD 0402 125°C Automotive T/R	**$0.05**	**33**	**33**

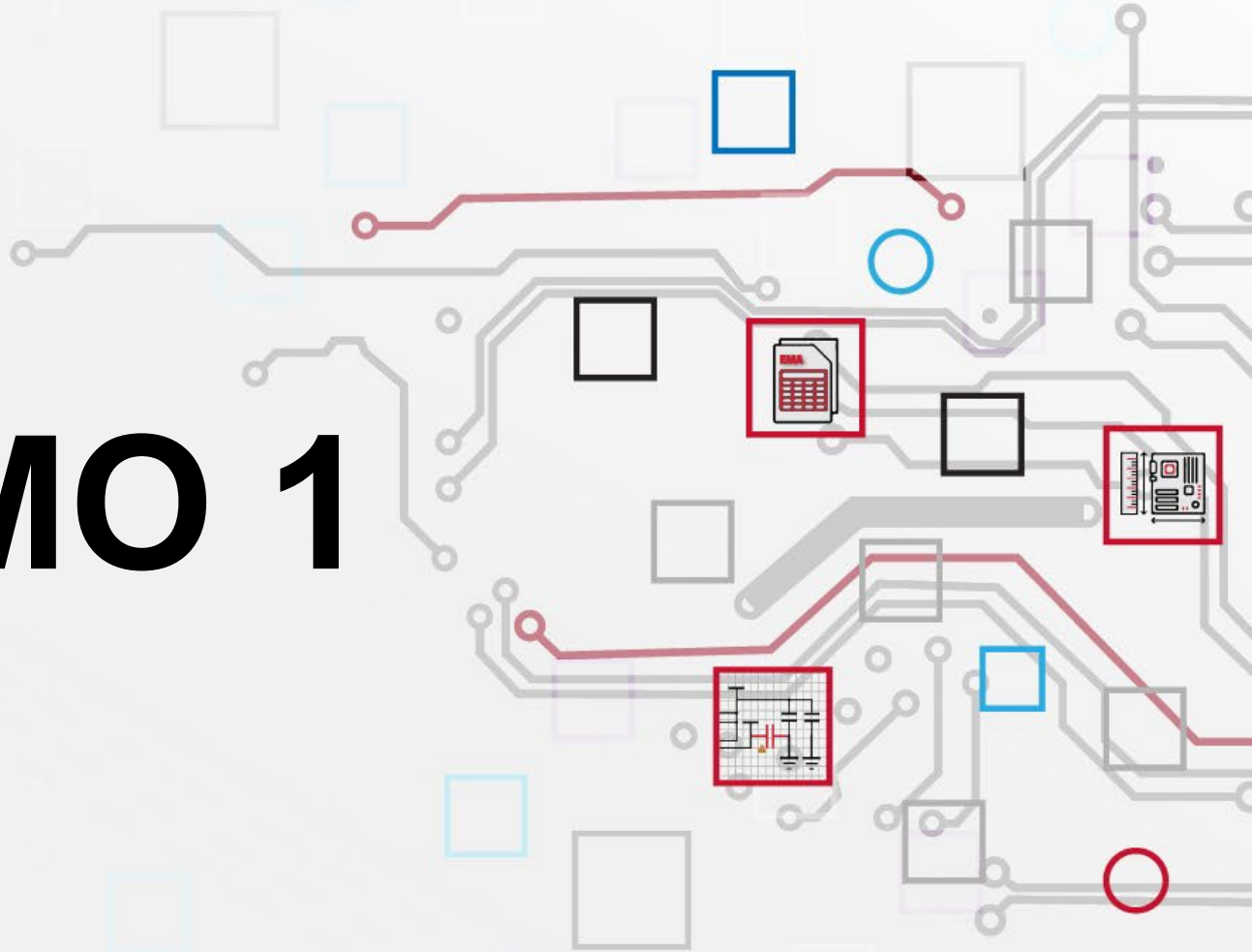
PART SELECTION

LiveBOM

- On-demand supply chain intelligence
- Reviews and provides a grade
- Swap and update parts quickly as needed
- Ensure a compliant and orderable BOM
- Available per design or at a library level



DEMO 1

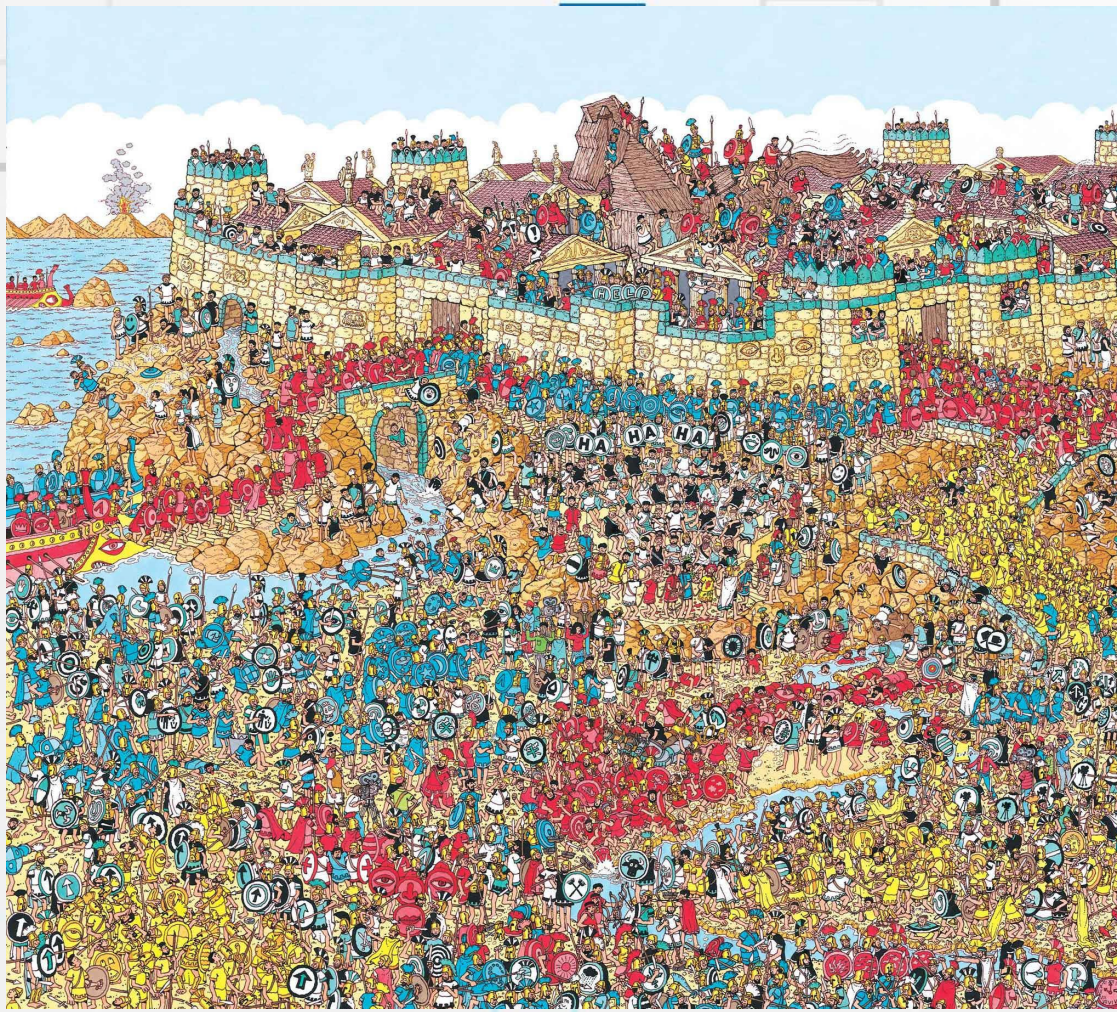


ISSUE 2/6

Hard to Spot / Diagnose Electrical SI/PI Issues

Problems

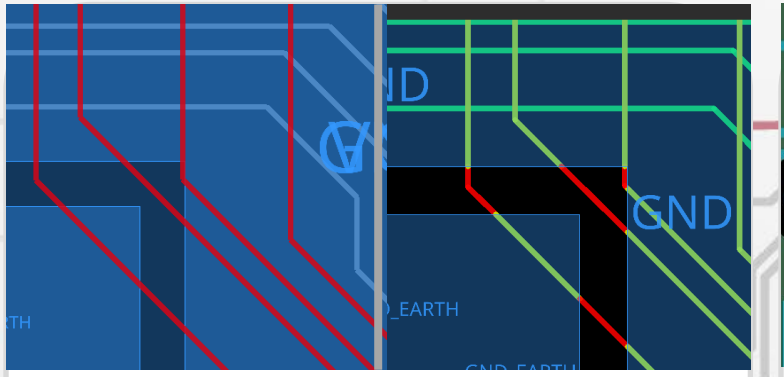
- Signal quality issues in your design that are very hard to detect visually
- Can even be challenging to debug in hardware
- How can we identify and prevent / resolve these issues early?



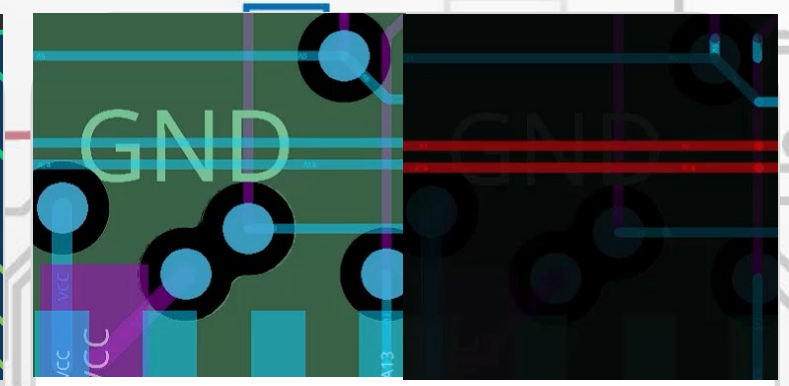
In-Design Analysis

Solution

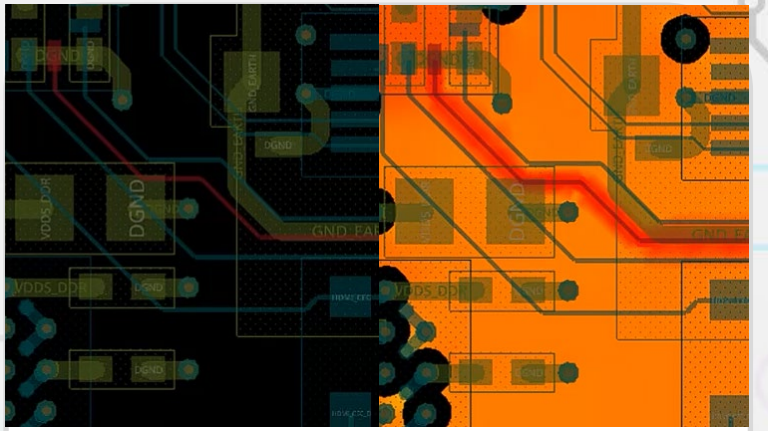
- Leverage Simulation & Real-Time DRC to spot issues as they happen
- Visualize designs contextually
- Do this as you design with minimal setup / configuration



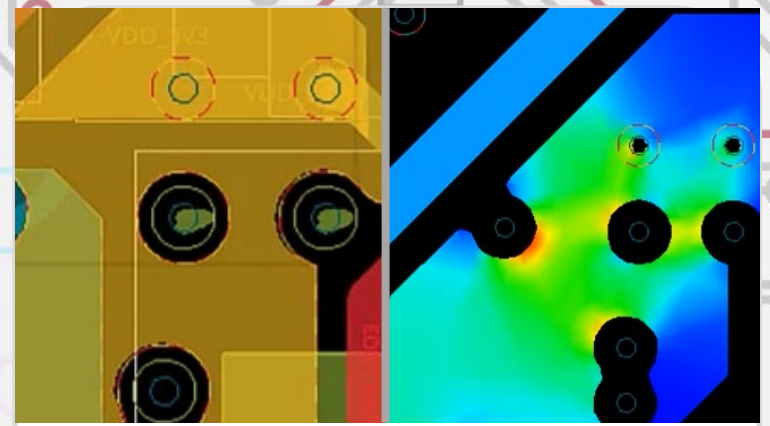
SPLIT PLANE ROUTING



COUPLING

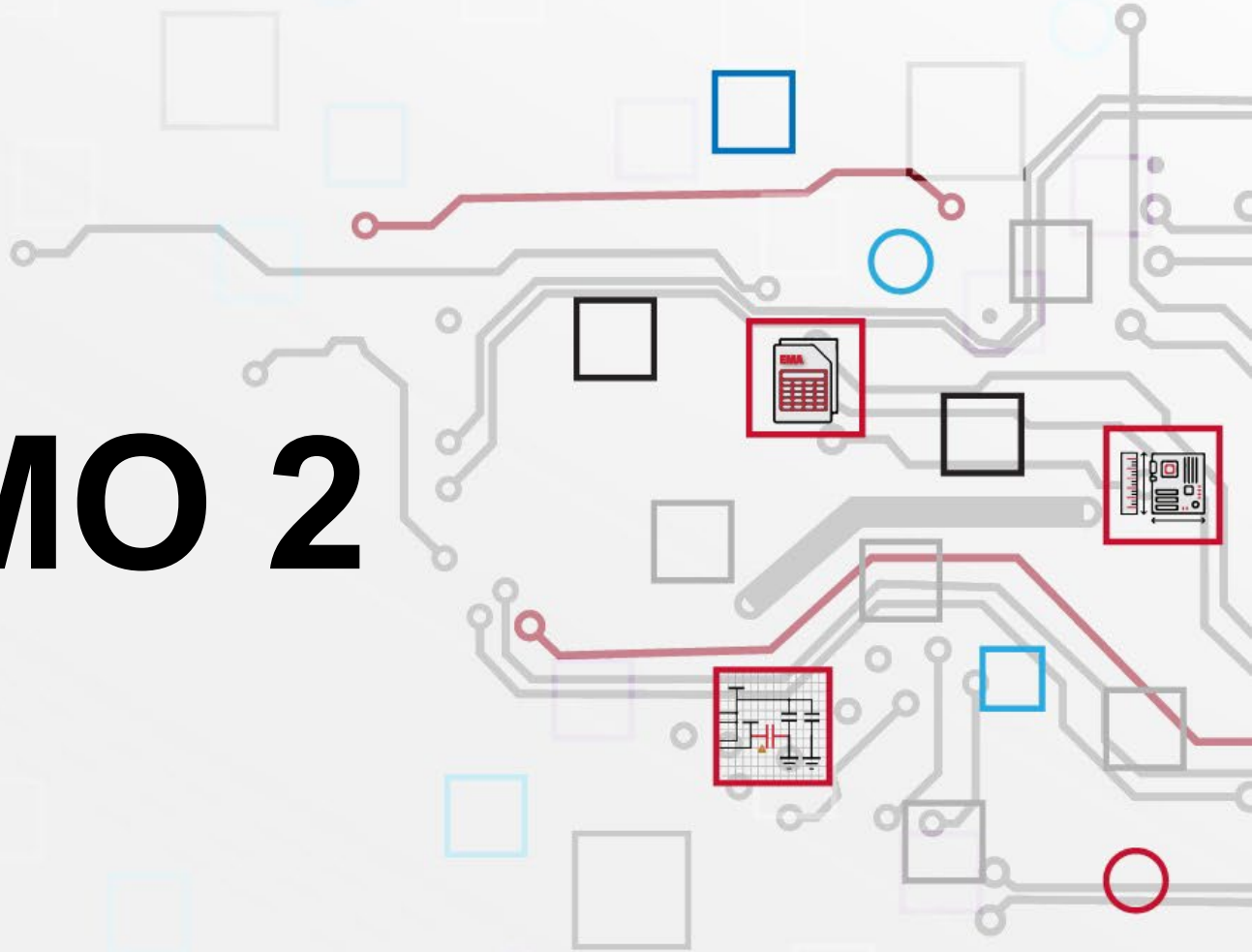


RETURN PATH



CURRENT DENSITY

DEMO 2

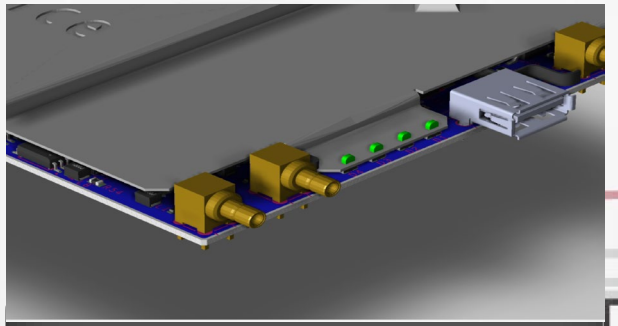


ISSUE 3/6

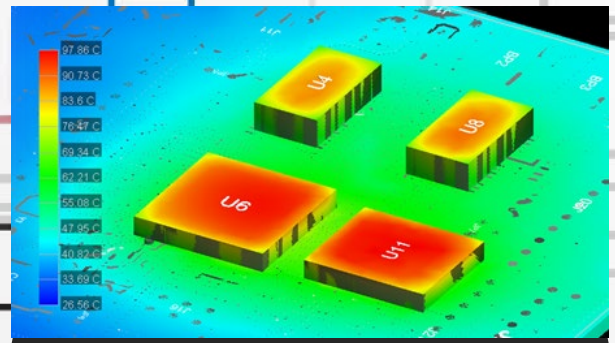
ECAD/MCAD Discrepancies

Problems

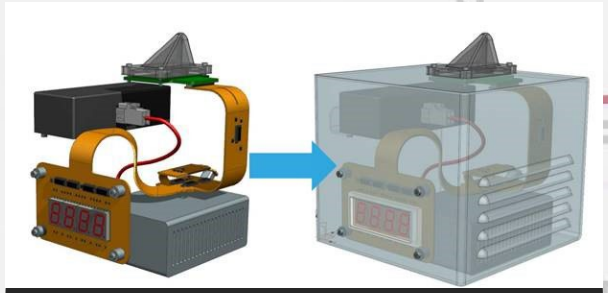
- MCAD / ECAD requirements not aligning or conflicting
- Mutual design elements not synchronized
- Unable to review / visualize electrical and mechanical elements holistically



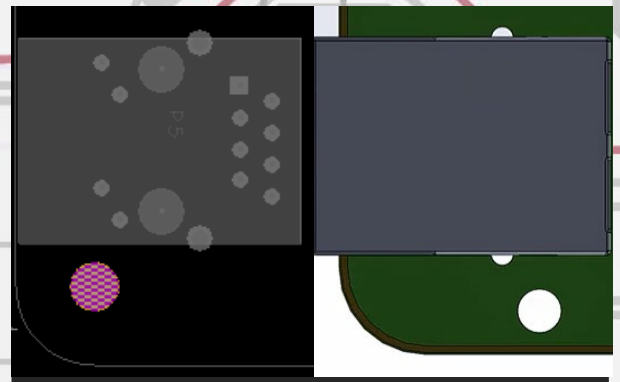
FIT PROBLEMS



Thermal Analysis



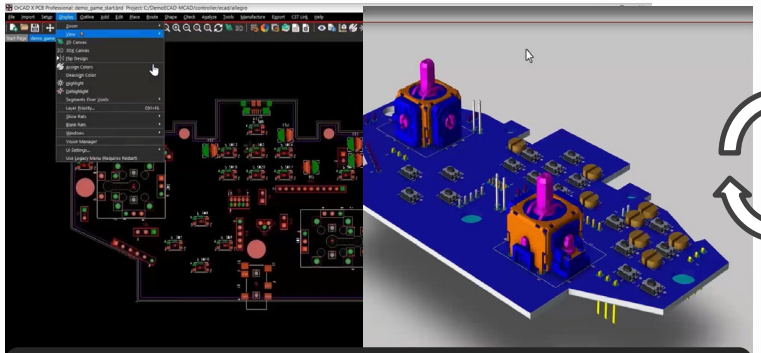
Holistic View



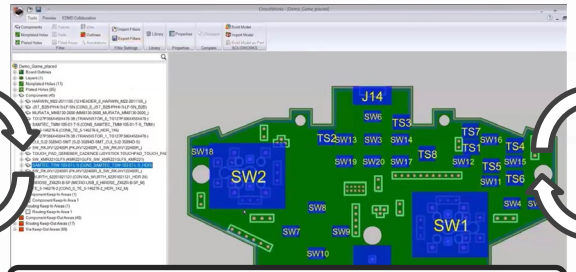
Uncommunicated Changes

ECAD/MCAD

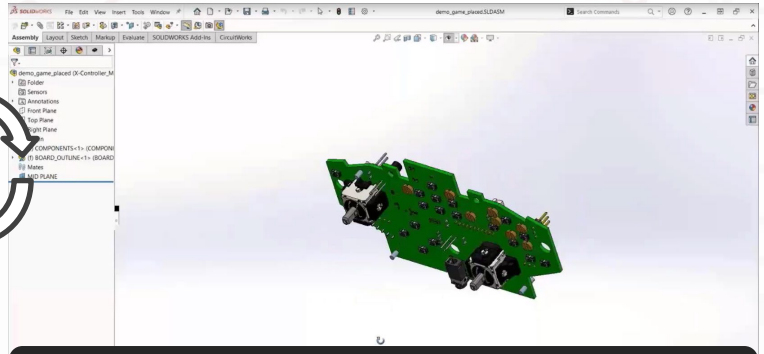
3D Design & Data Exchange



OrCAD X



DATA EXCHANGE



MCAD

MCAD DRIVEN

- Outline
- Clearance Rules
- Mounting Holes
- Cutouts

- Bi-directional data exchange
- Accept & Reject
- Change Tracking
- Sync Early & Often

ECAD DRIVEN

- Copper
- Vias
- Detailed ECAD Models
- Board Thickness

DEMO 3

ISSUE 4/6

DFM Issues

Problems

- Don’t want to find manufacturability issues late in the design cycle
- DFM issues can be hard to spot (and process dependent)
- DFM related changes are inherently late-stage changes

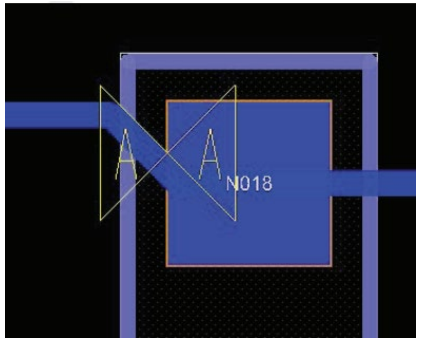
DFM ISSUES

DesignTrue DFM

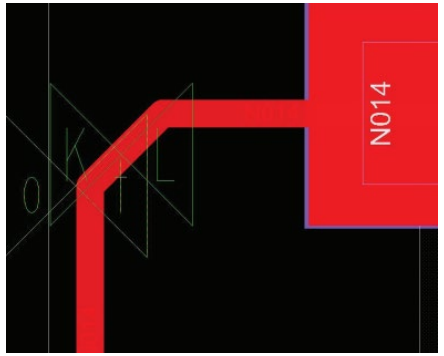
Solution

- Perform DFM checking as you design
- Leverage industry standard IPC DFM checking as well as manufacturer specific rules
- Create Documentation as an output of design

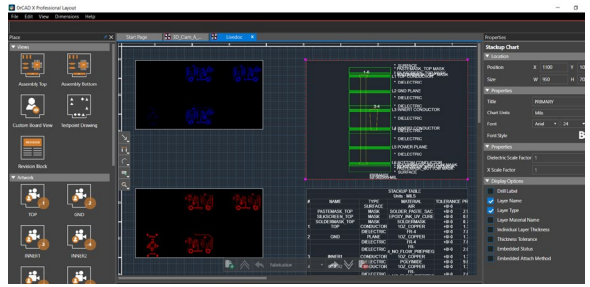
TOO CLOSE TO BOARD EDGE



ANNULAR RING

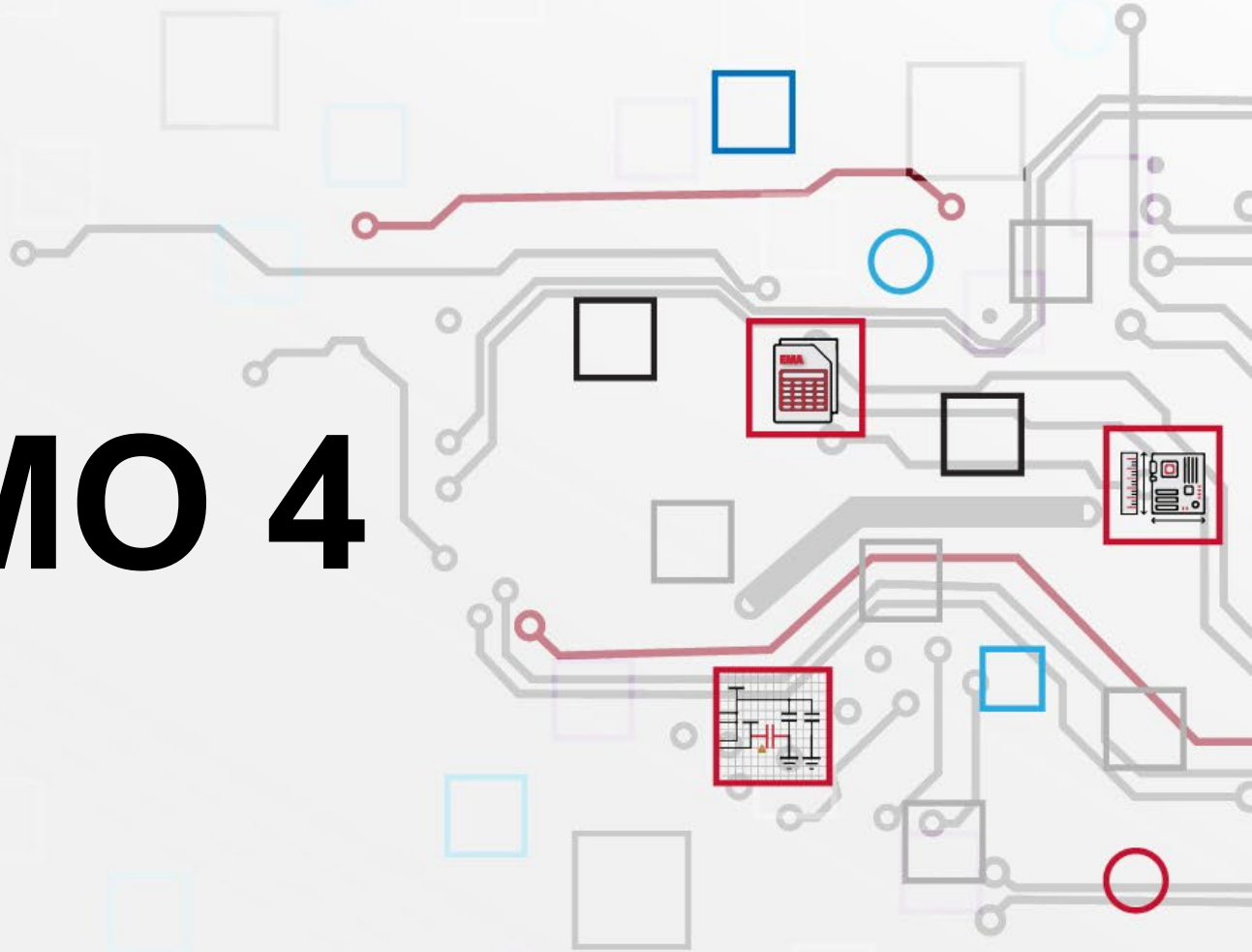


COPPER PAD TO CUTOUT



AUTOMATED DOCUMENTATION

DEMO 4

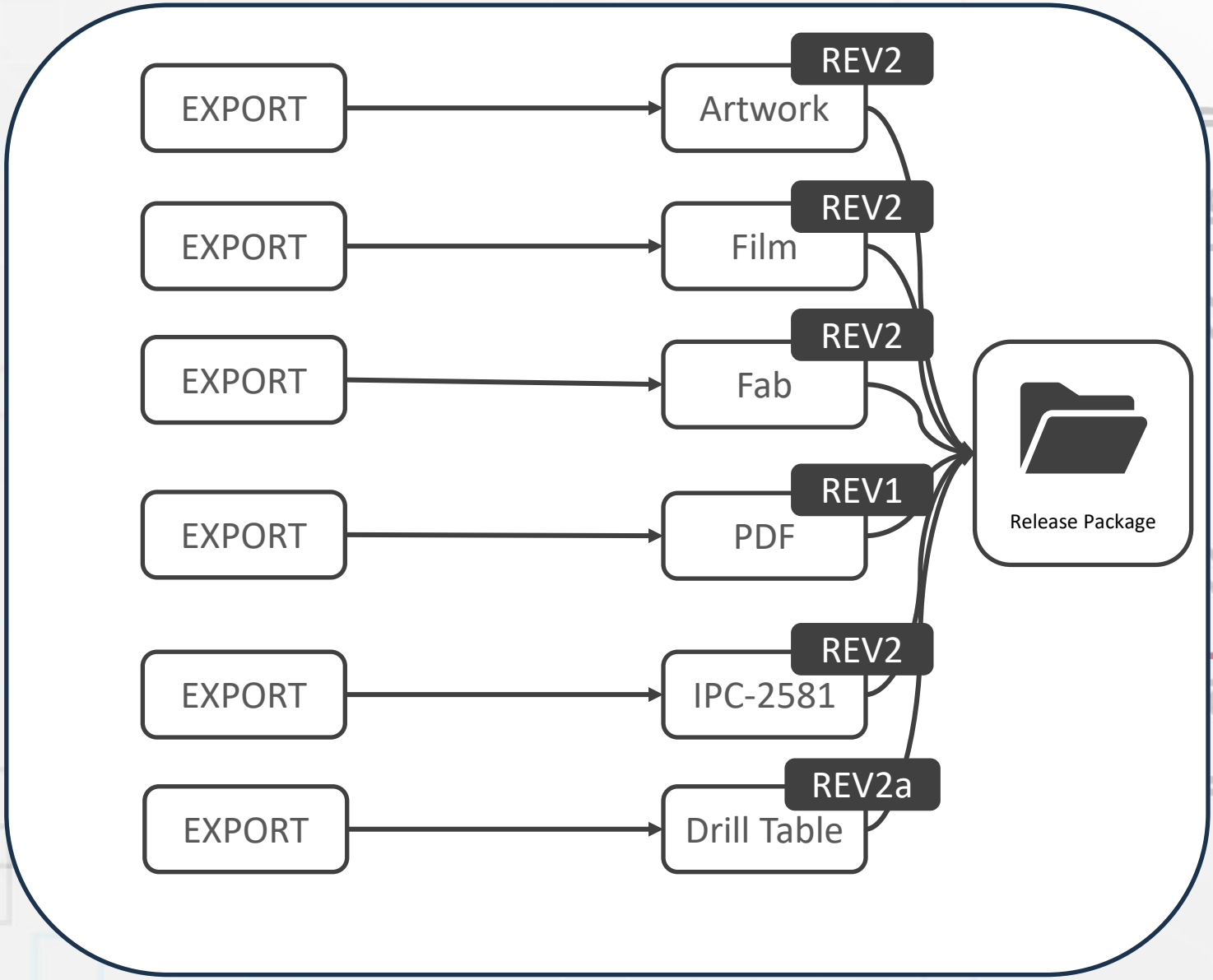


ISSUE 5/6

Release to Manufacturing

Problems

- Lots of files needed to provide manufacturing ‘instructions’
- Easy to lose synchronization as design iterates (especially at the end)
- Risk manufacturing delays / respins

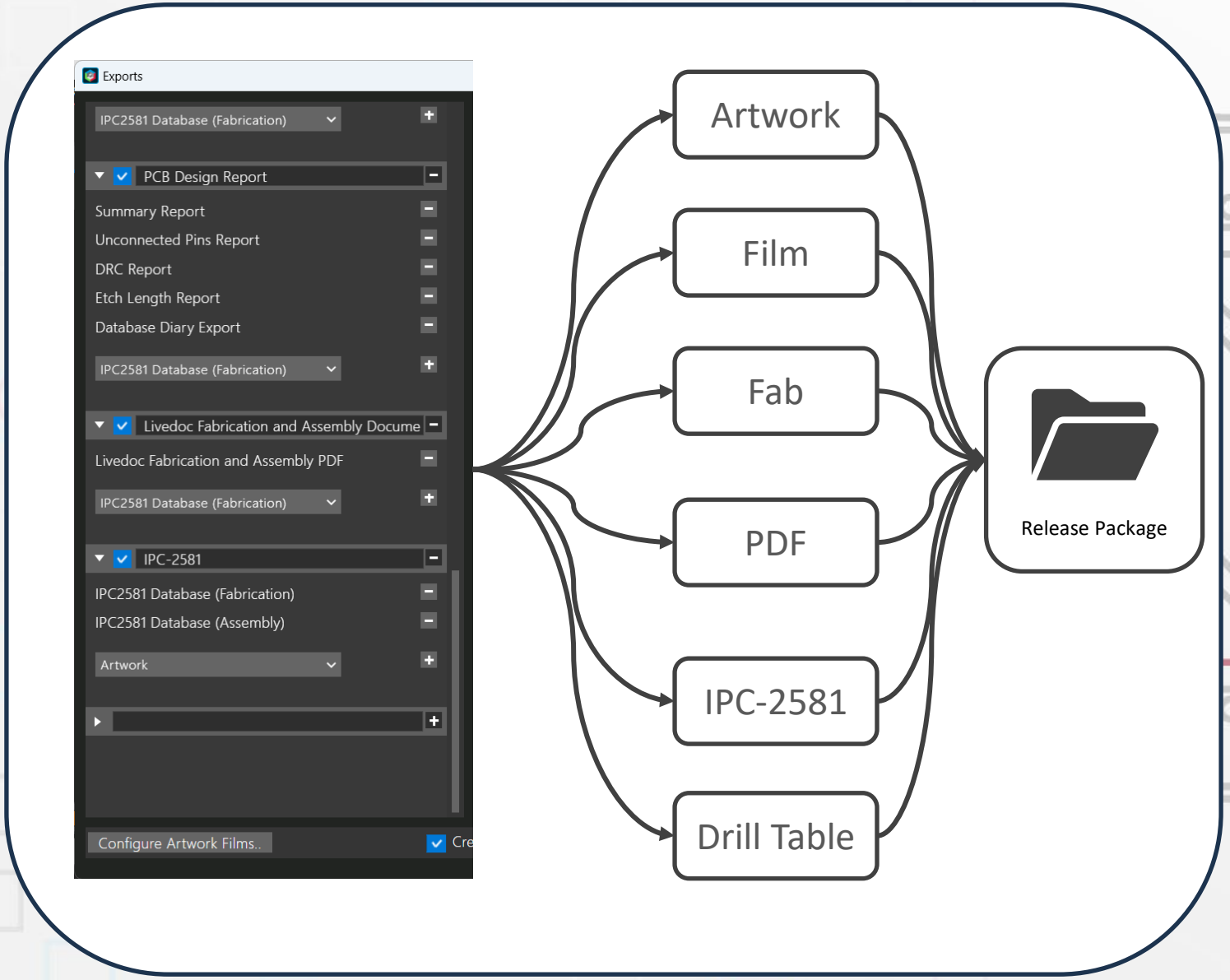


RTM

MFG Packager

Solution

- Predefine RTM recipes
- Ensure MFG instructions matches your CAD data
- Customize as needed



DEMO 5

ISSUE 6/6

Time….

Problems

- Don’t have enough time to complete designs on schedule
- Designs being released with errors or compromises due to schedule pressure
- No time for design space exploration or optimization

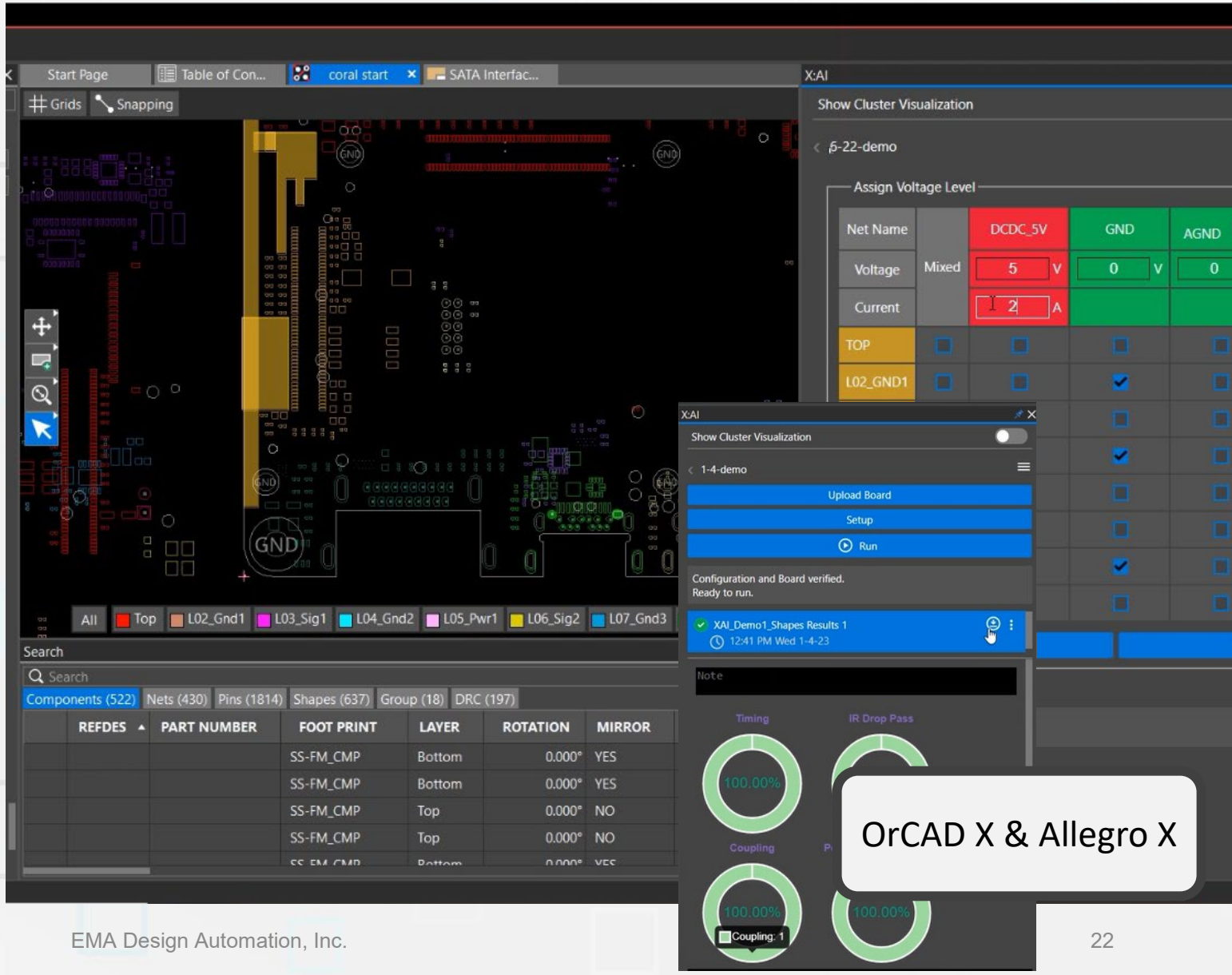
Each Task Competes for Limited Engineering Time

CYCLE REDUCTION

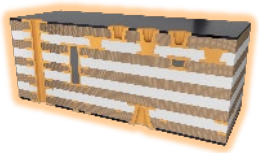
Allegro X AI

Solution

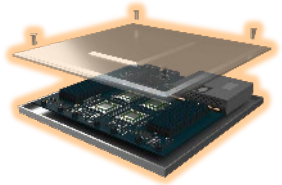
- Dramatically reduce time for initial placement, plane creation, and routing
- Integrated directly inside OrCAD X & Allegro X
- Constraint, Schematic, DFM, and electrically aware



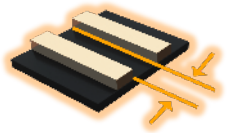
X AI™ Methodology



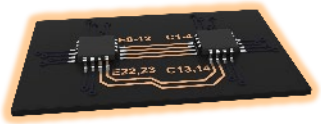
Layer Stack



Board Outline - MCAD + fixed component location(s)

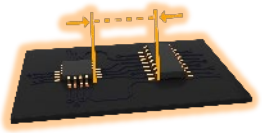


Physical constraints

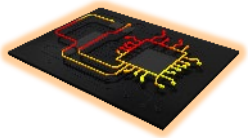


Netlist

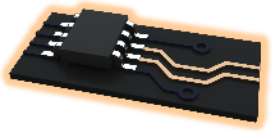
PWR/GND



Assembly rules

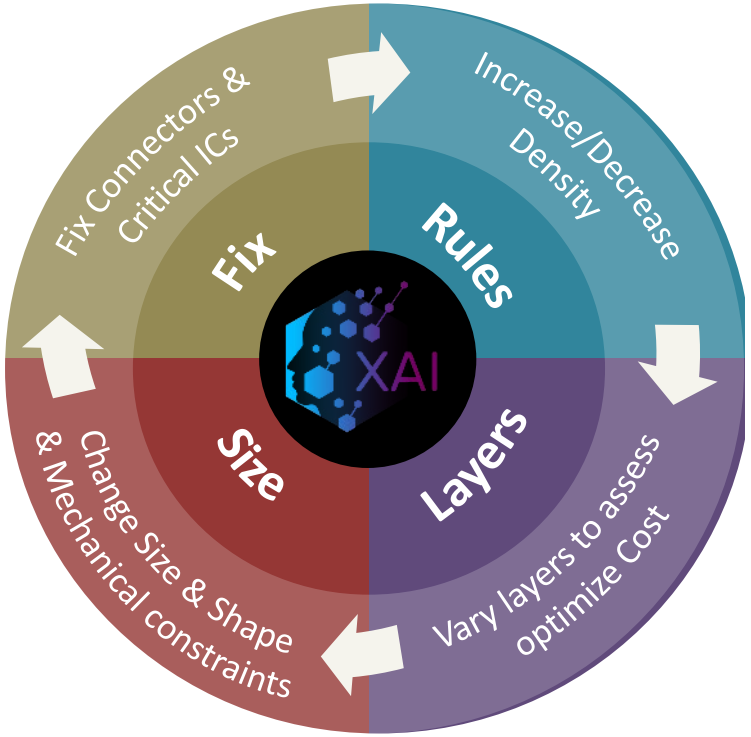


Power Distribution Network



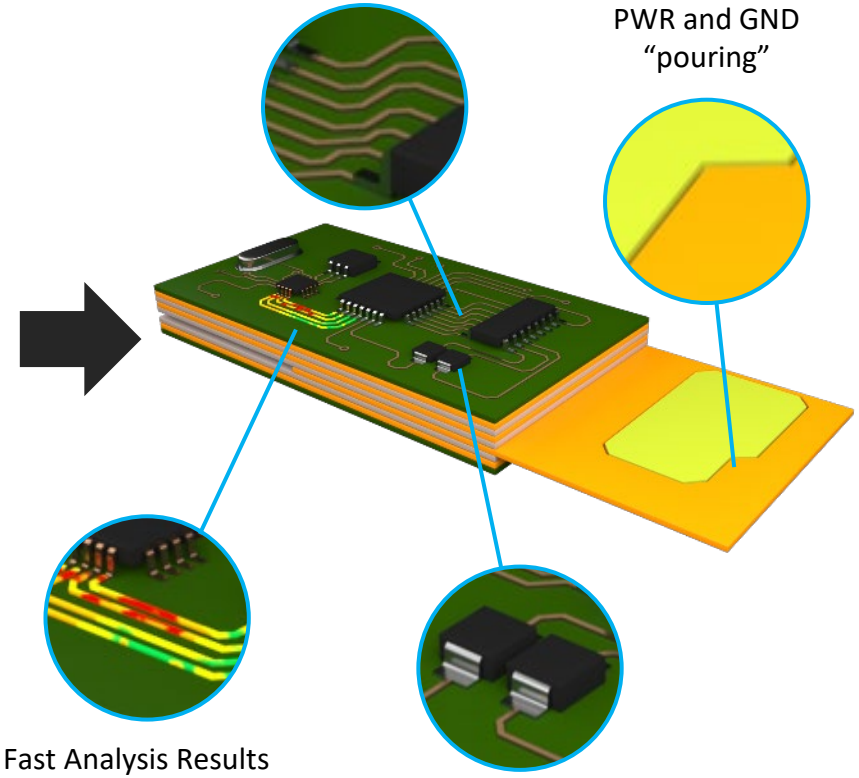
Differential Pairs & Critical nets

Rapid Solution Space Exploration



Routing

PWR and GND "pouring"

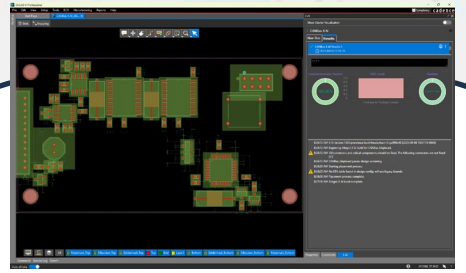


Fast Analysis Results (SI PI)

Board Placement

EMA Design Automation

3 Engines



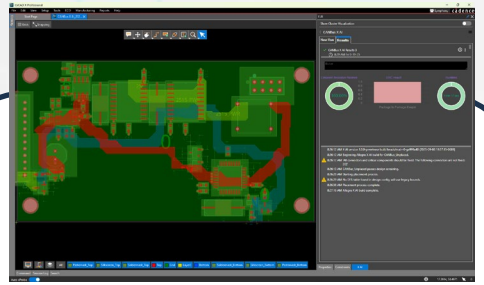
Placement AI

New Placement Optimization Engine

Constraint and Rule Driven

Example Use Cases:

- General Placement Acceleration
- Test Placement Alternatives
- Route Congestion
- Fit Study



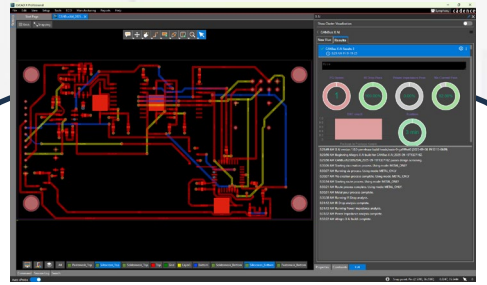
Copper AI

Full Copper Pour Engine

Fast Iterative Approach to Copper & Plane Generation

Example Use Cases:

- Cooper Pour Acceleration
- Power Delivery Analysis



Route AI

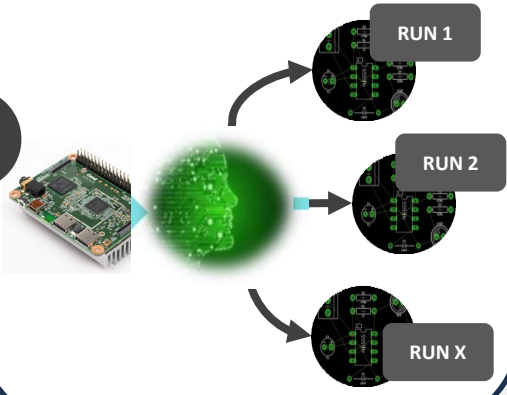
New Routing Engine. Built from the Ground Up

Enables any angle routing. Massive capacity (support for MCM / Pckg)

Example Use Cases:

- Full Board Routing Closure
- Routability Studies
- Routing Updates

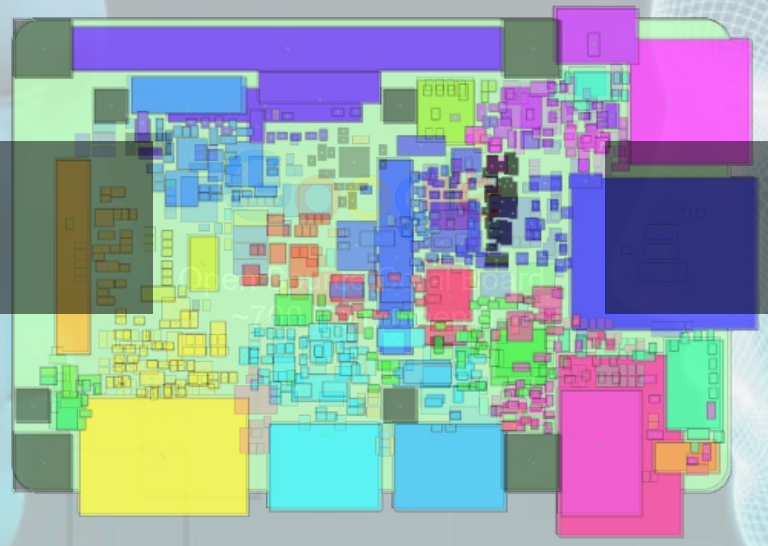
Parallel Execution



X AI Results

EMA Design Automation

PLACEMENT	WIRELENGTH	MANUFACTURING	ELECTRICAL ANALYSIS
3 days to 75 Minutes	12% Improved	100% Compliant	Optimized



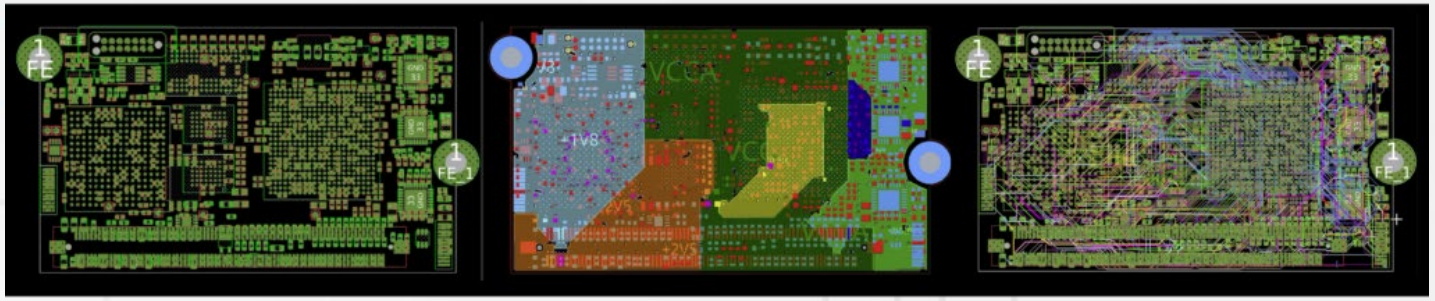
Human Alone

w/ X AI

Case Study

Danfoss Uses Cadence Allegro X AI to Amplify PCB Design for Energy Efficiency

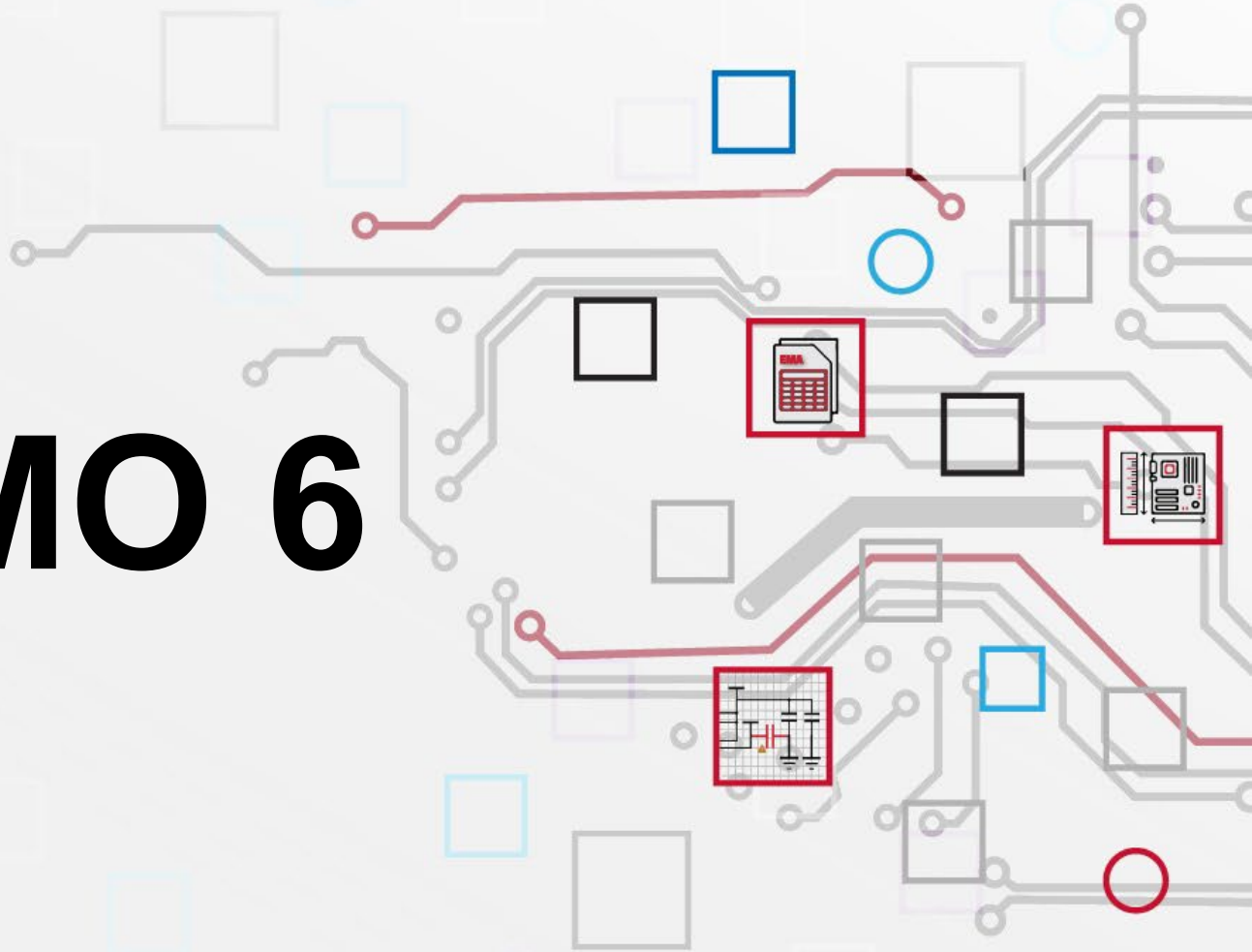
AI Placement | AI Pours | AI Routing



> "I ended up at the first run with a very nice layout for my design. I'll say that not much needed to change.
>
> **Bo Kroman, Senior ECAD Engineer, Danfoss**

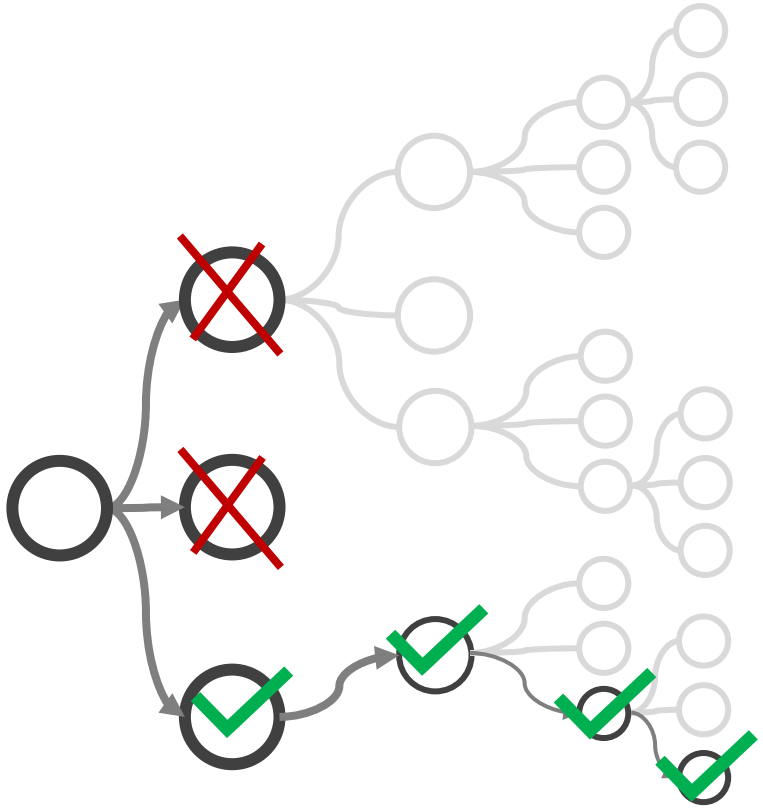
[Danfoss Uses Cadence Allegro X AI to Amplify PCB Design for Energy Efficiency | EMA Design Automation]

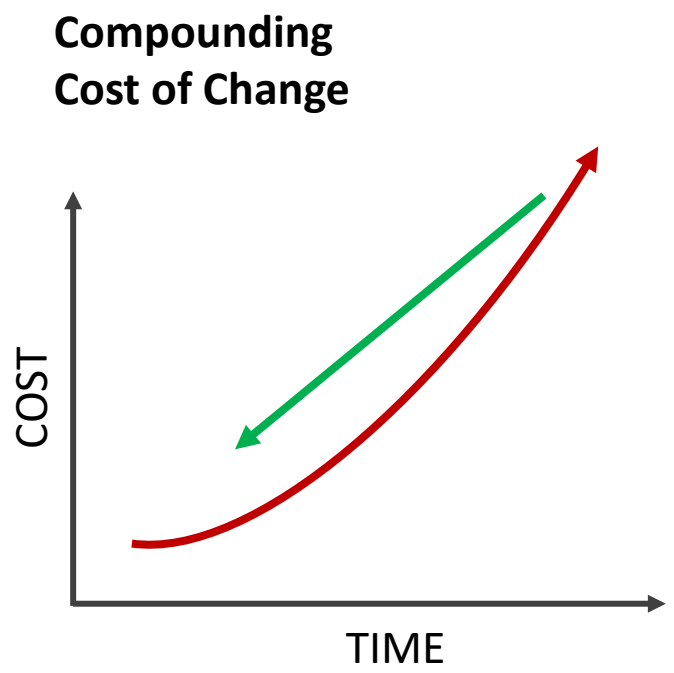
DEMO 6



Shift-Left Design

- Identify and Solve Early
- Review and Fix in Context
- Eliminate Late-Stage Design Changes

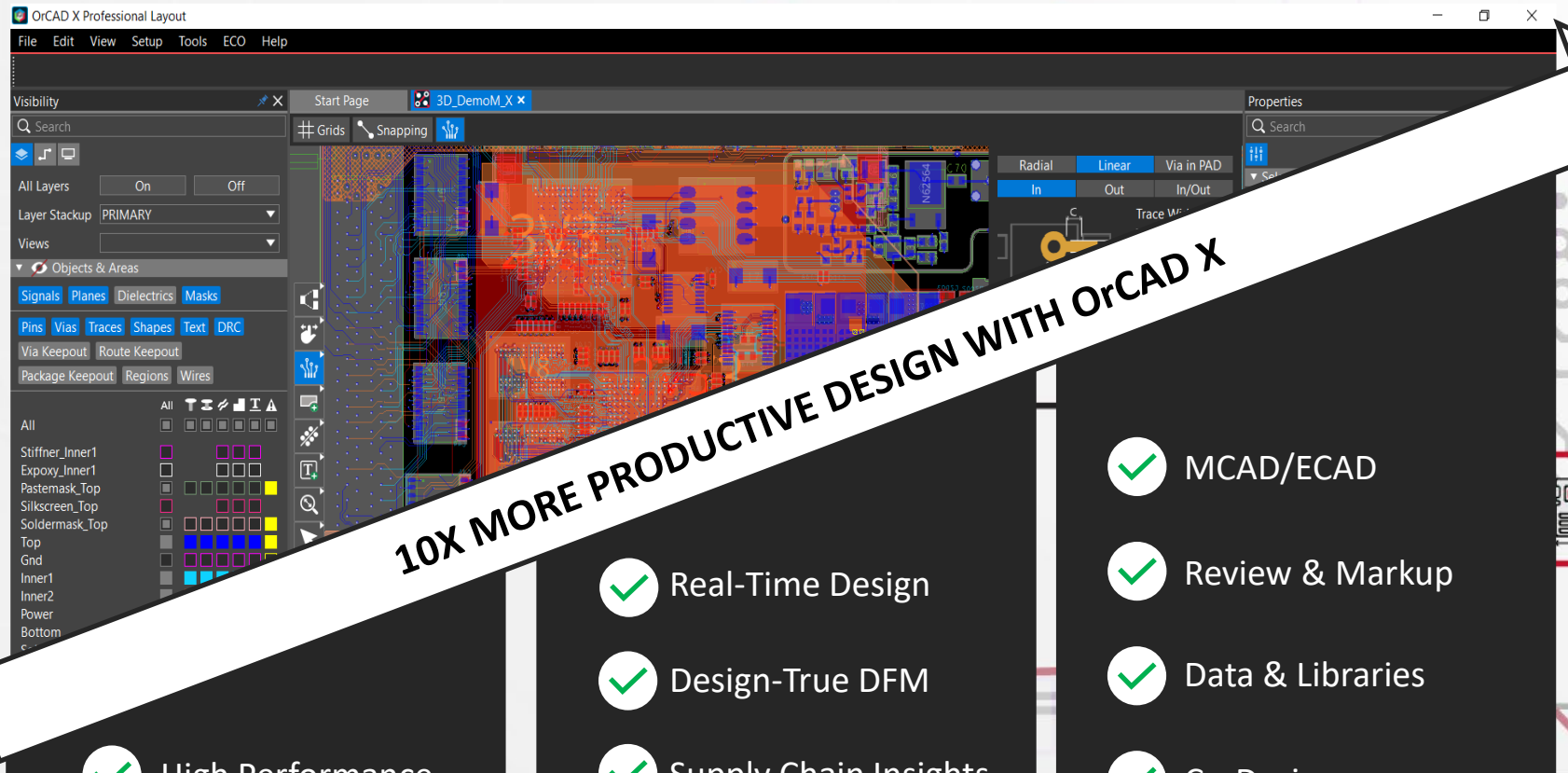




NEXT GEN

OrCAD X

- Real-Time Visibility in Context
- Connected Platform for Holistic Design
- Scalable to Grow with Design Needs



10X MORE PRODUCTIVE DESIGN WITH OrCAD X

- High Performance
- AI Enabled

Design Fast

- Real-Time Design
- Design-True DFM
- Supply Chain Insights
- In-design Analysis

Design Correct

- MCAD/ECAD
- Review & Markup
- Data & Libraries
- Co-Design

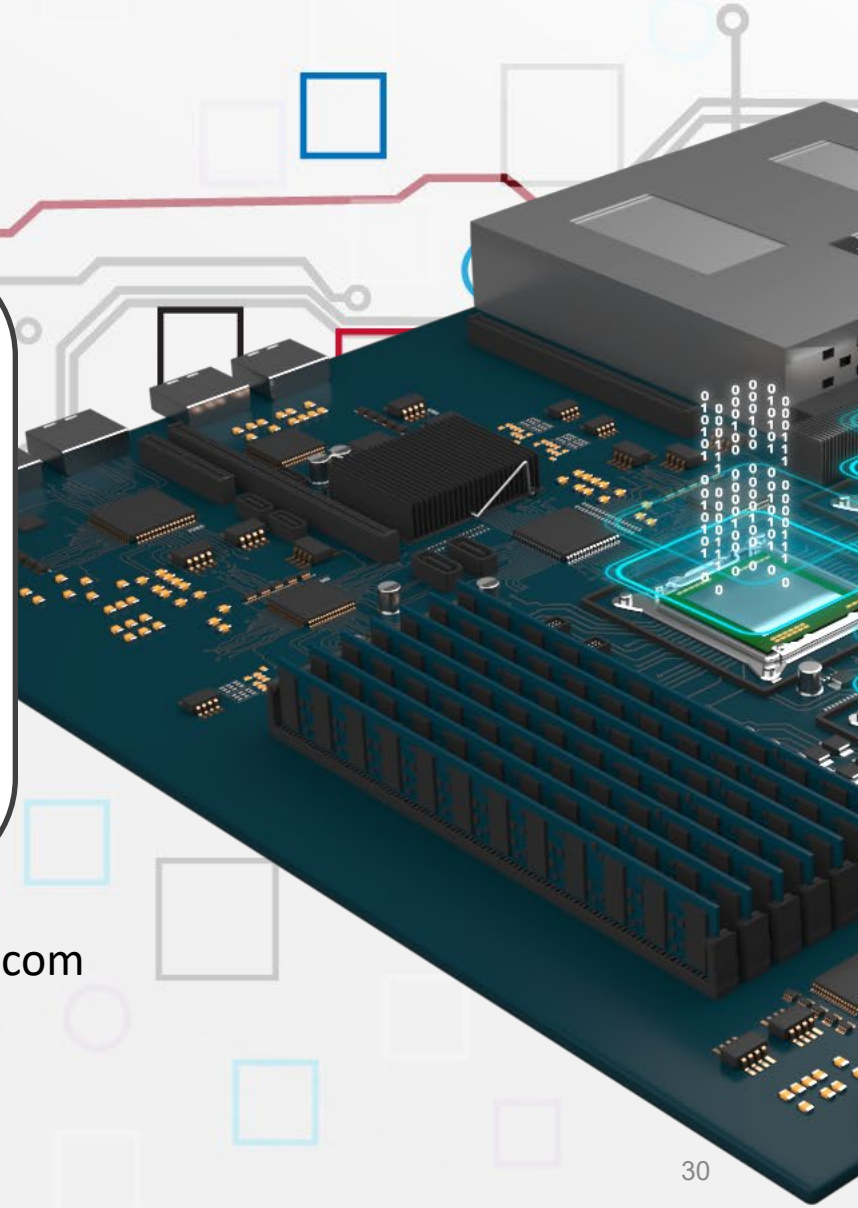
Design Connected

Thank You

ECAD Experts

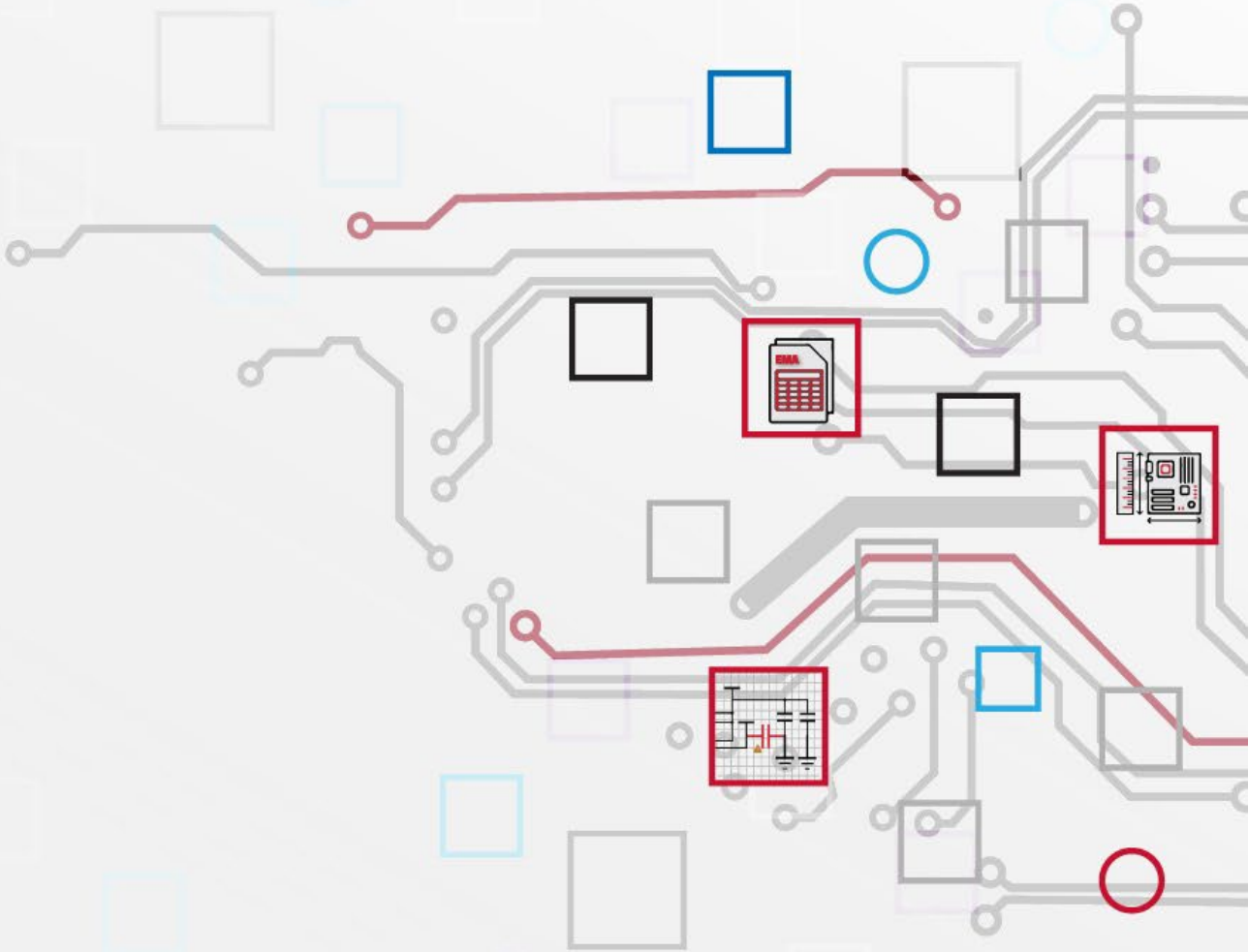
30+ Years in PCB Design

Software – Support - Services



Questions? Please contact us at info@ema-eda.com | www. ema-eda.com

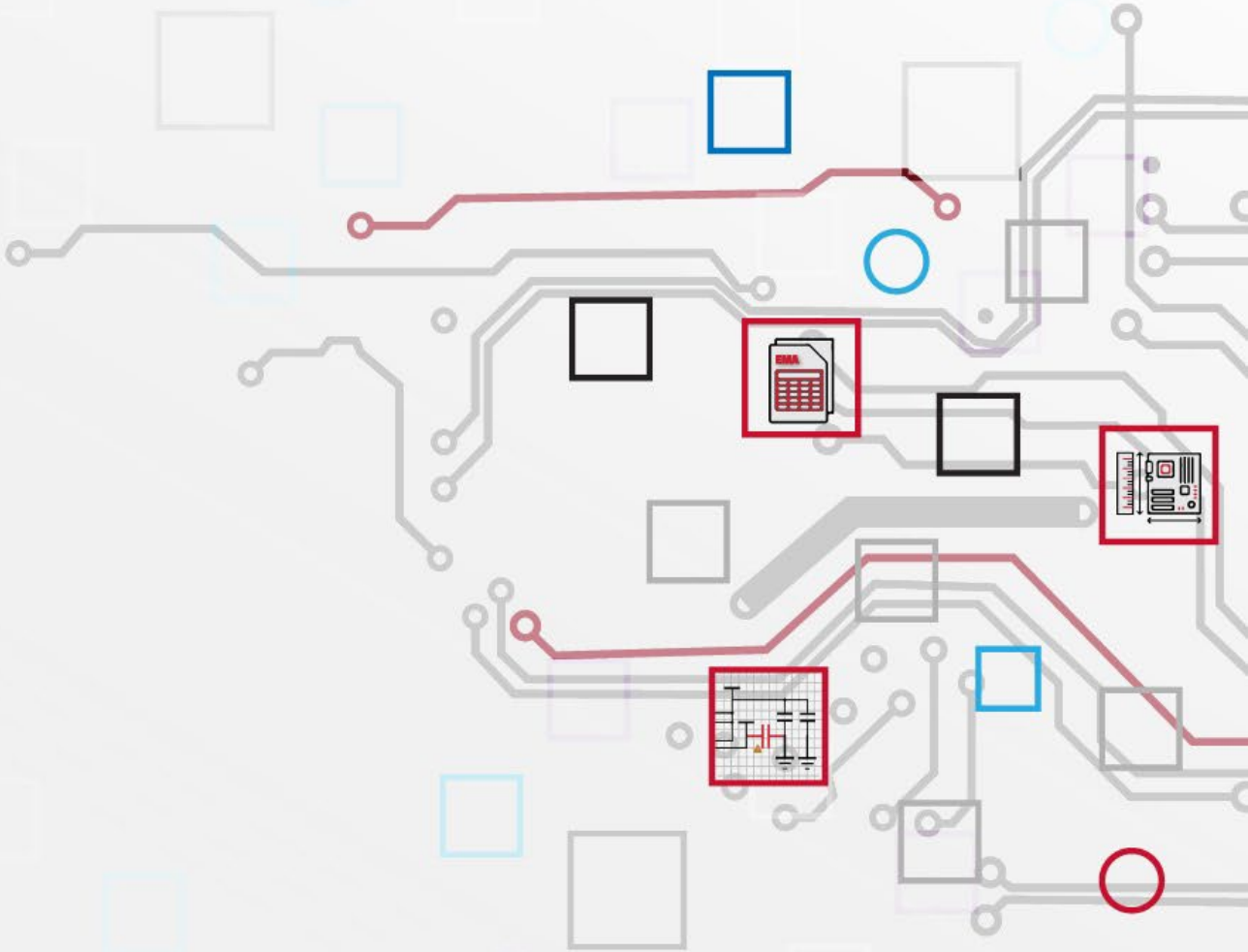
Backup



EMA Design Automation

OrCAD X

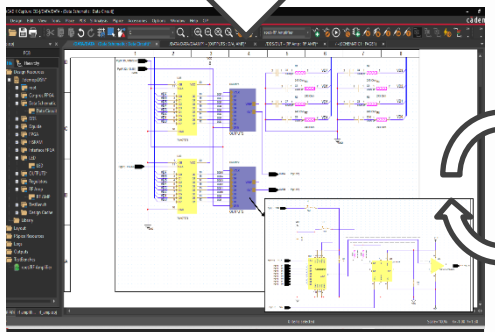
Next Generation PCB Design Platform



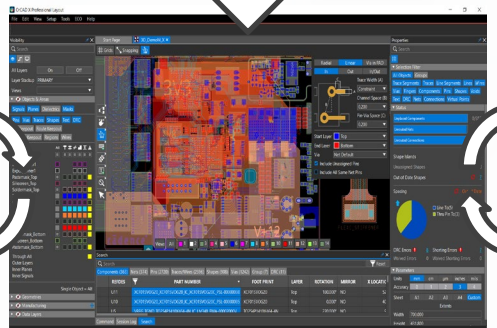
EMA Design Automation

Simulation & Analysis

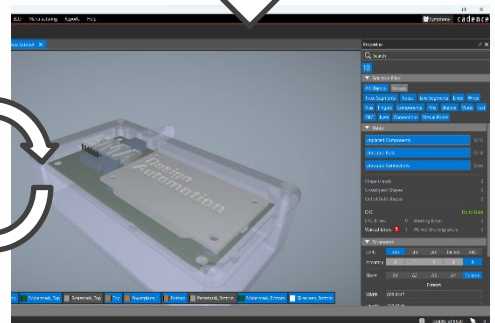
SI – PI – RF – EM – Thermal - SPICE



Logical



Physical

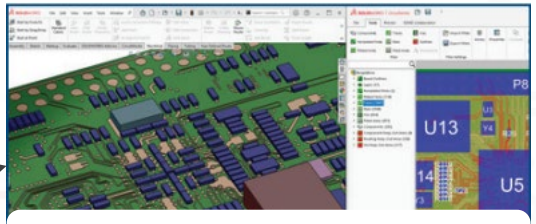


3D

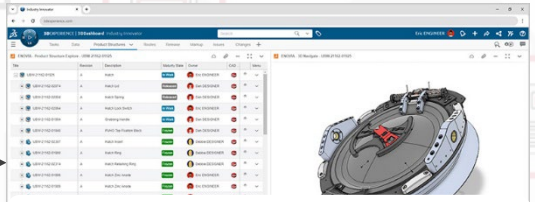
Real-Time Design

Constraints – Libraries – Supply Chain – Change Management

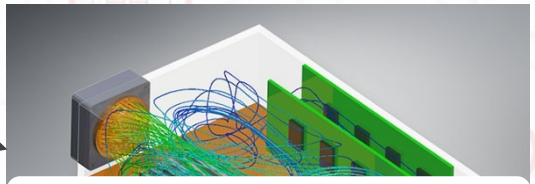
OrCAD X Design Environment



MCAD



PLM

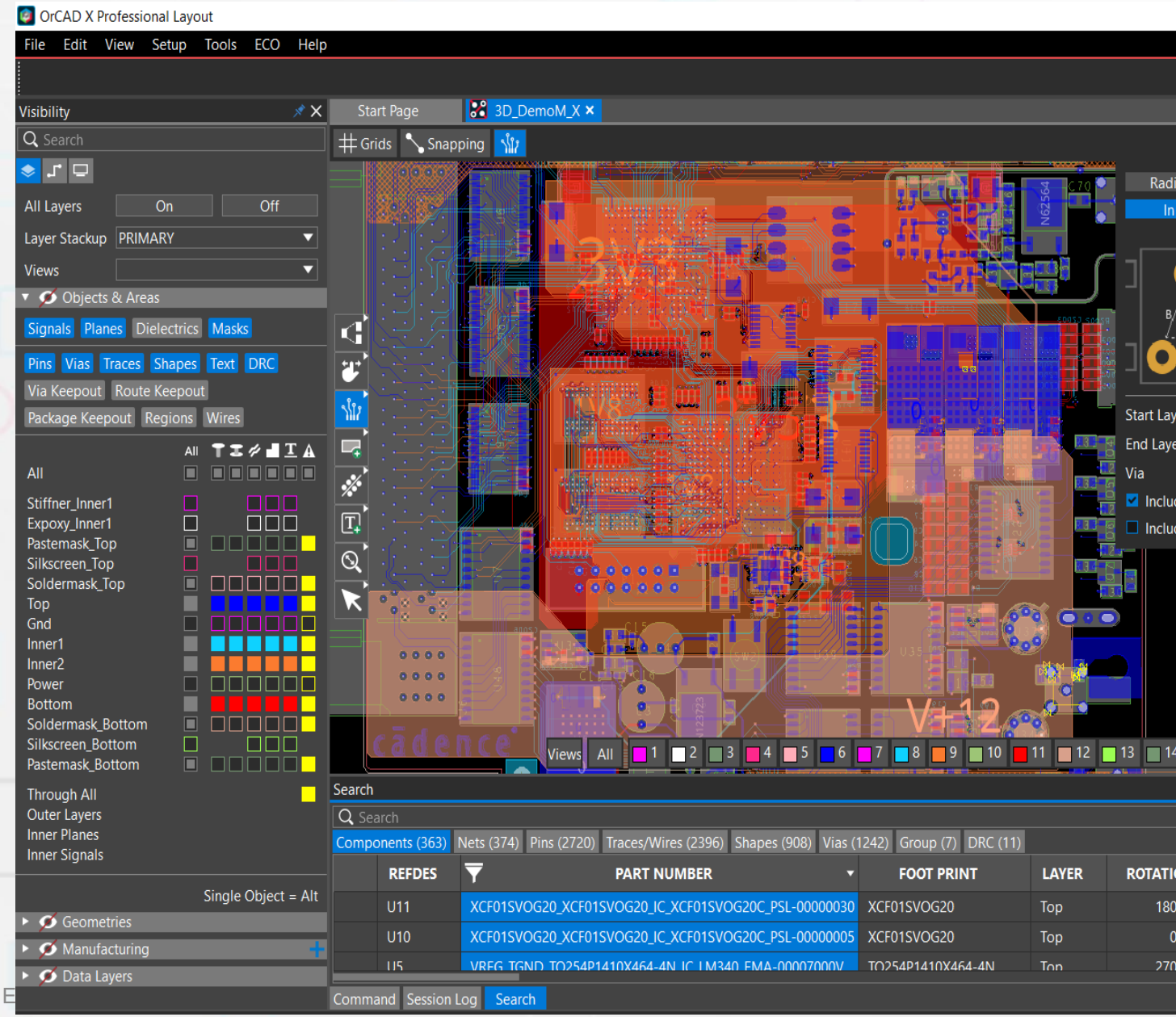


System Simulation

LAYOUT & ROUTING

Presto

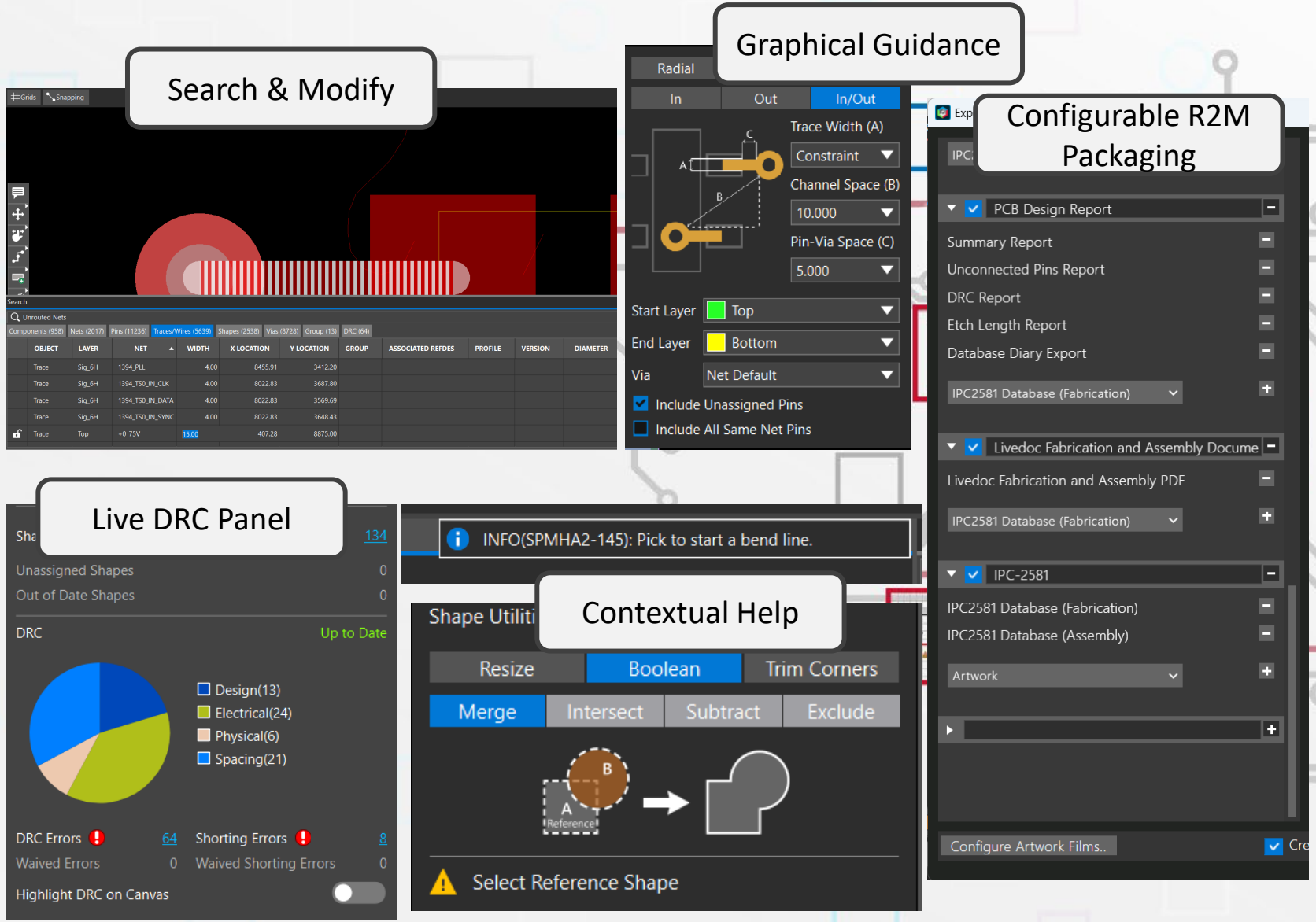
- New PCB Layout UX
- Focused on productivity & ease of use combined with powerful layout and routing engines of Allegro
- Fully compatible with OrCAD & Allegro PCB Editor (same .brd)
- Designed for Full-time & Occasional Use



LAYOUT & ROUTING

Presto

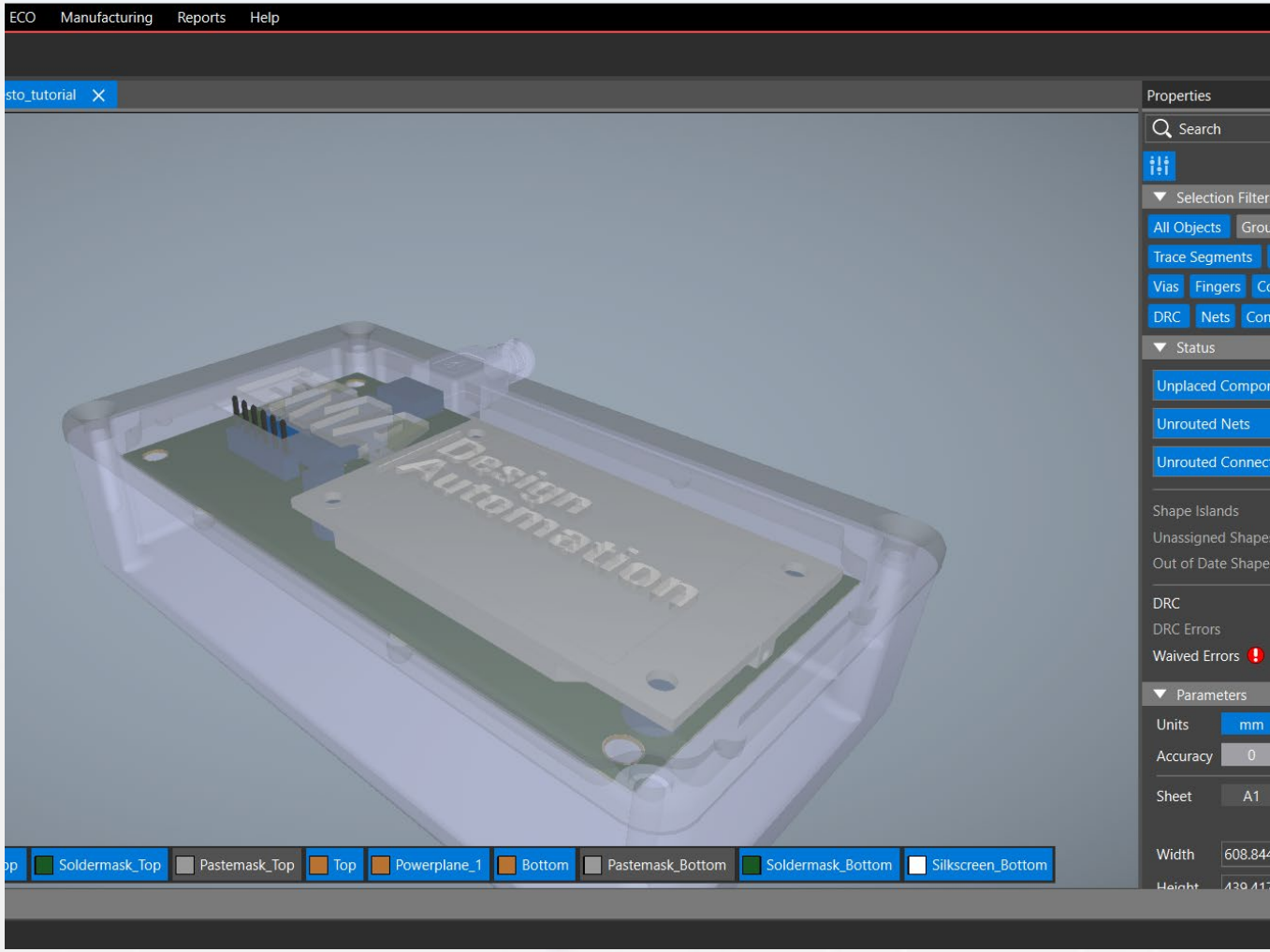
- Easy to Use
- Designed to make information discoverable, data presentation contextual
- Live links to drill into details where applicable
- Built-in search engine with live editing
- Visual help and guidance



ELECTROMECHANICAL DESIGN

ECAD/MCAD

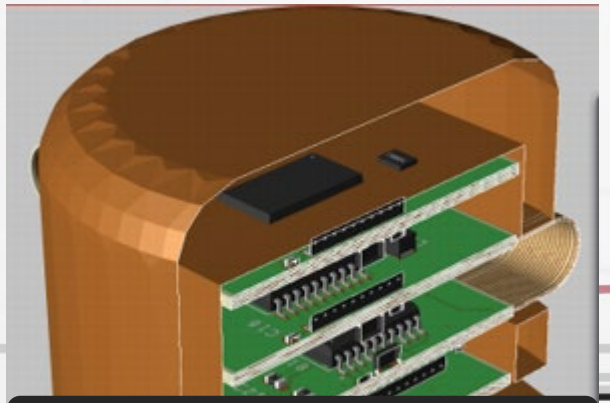
- New 3D engine, Built for performance
- Real-time 3D constraints
- Import mechanical elements – export design for mechanical integration



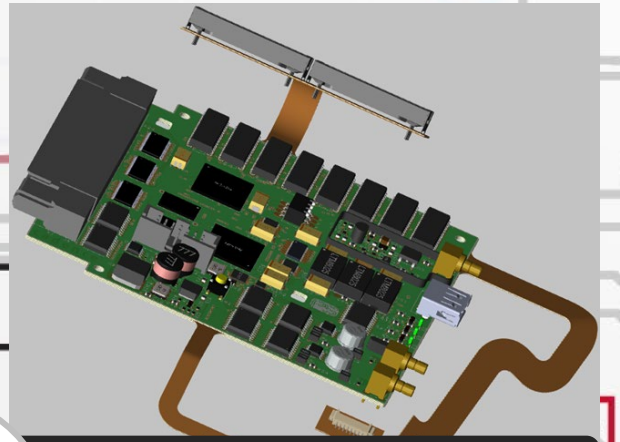
EMA Design Automation

OrCAD X
3D Engine

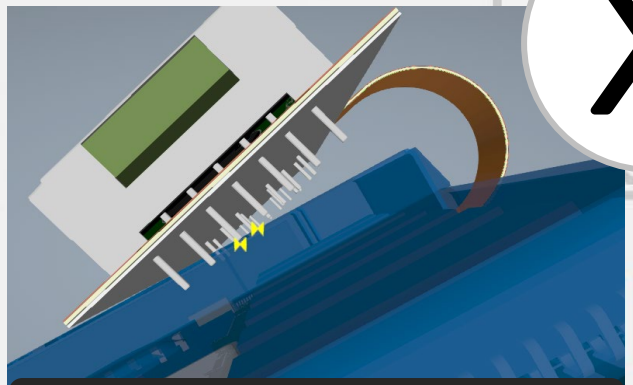
- Full Featured
- Easy to Use
- Cross Probe between 3D & 2D
- Automated 3D model mating and alignment



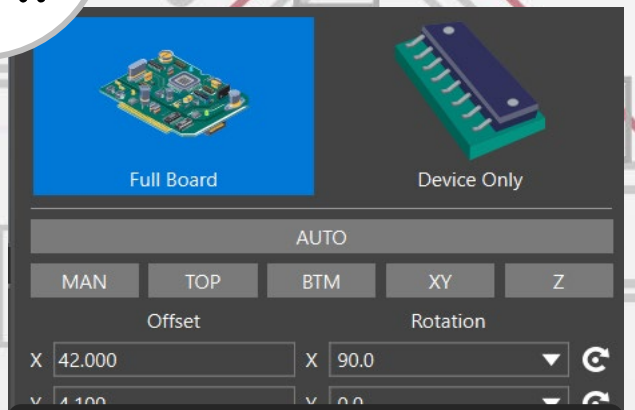
Split (Slice View)



Real-Time Bend & Fold



3D Constraints

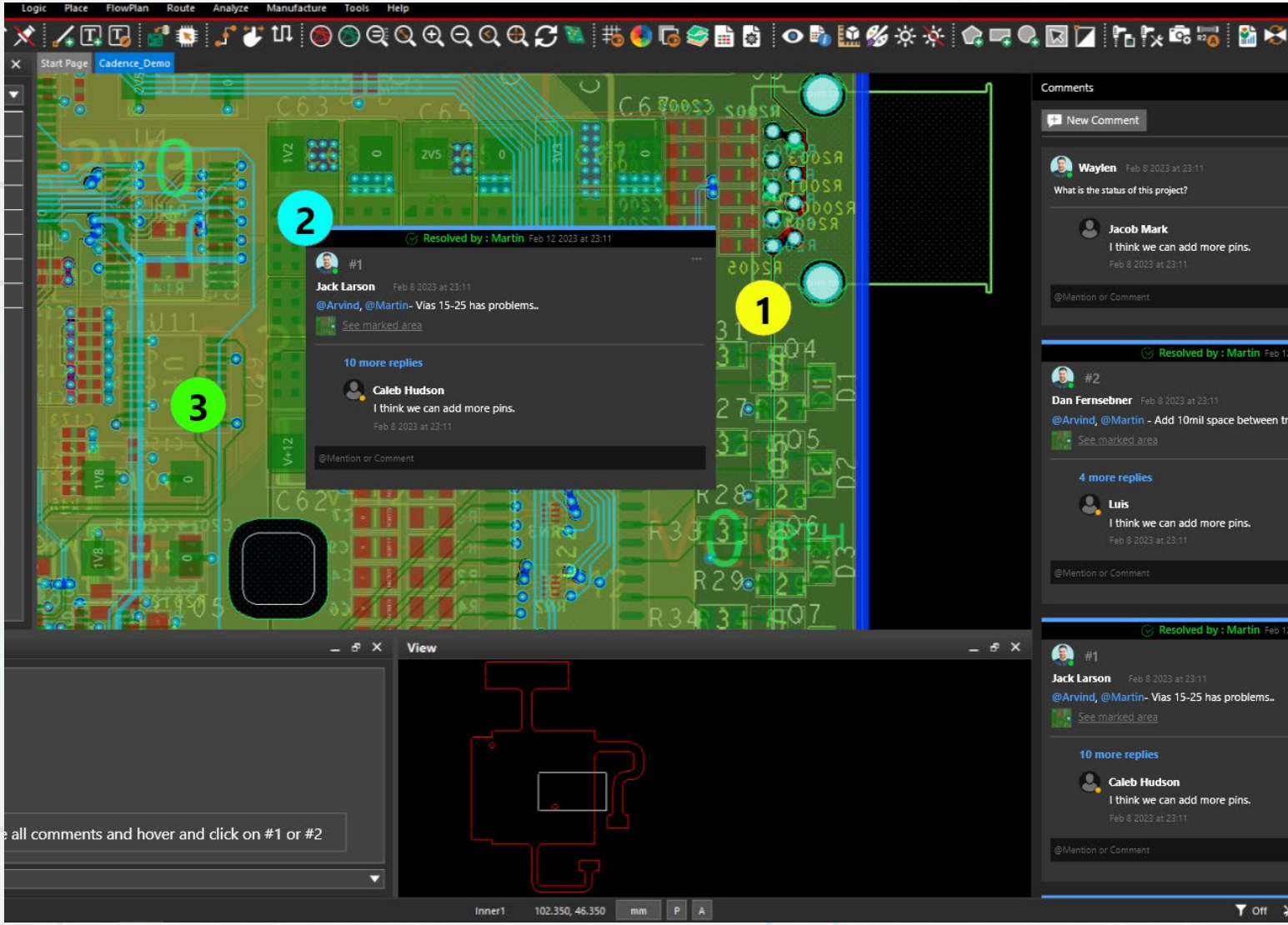


Model Mapping

COLLABORATION

Review & Markup

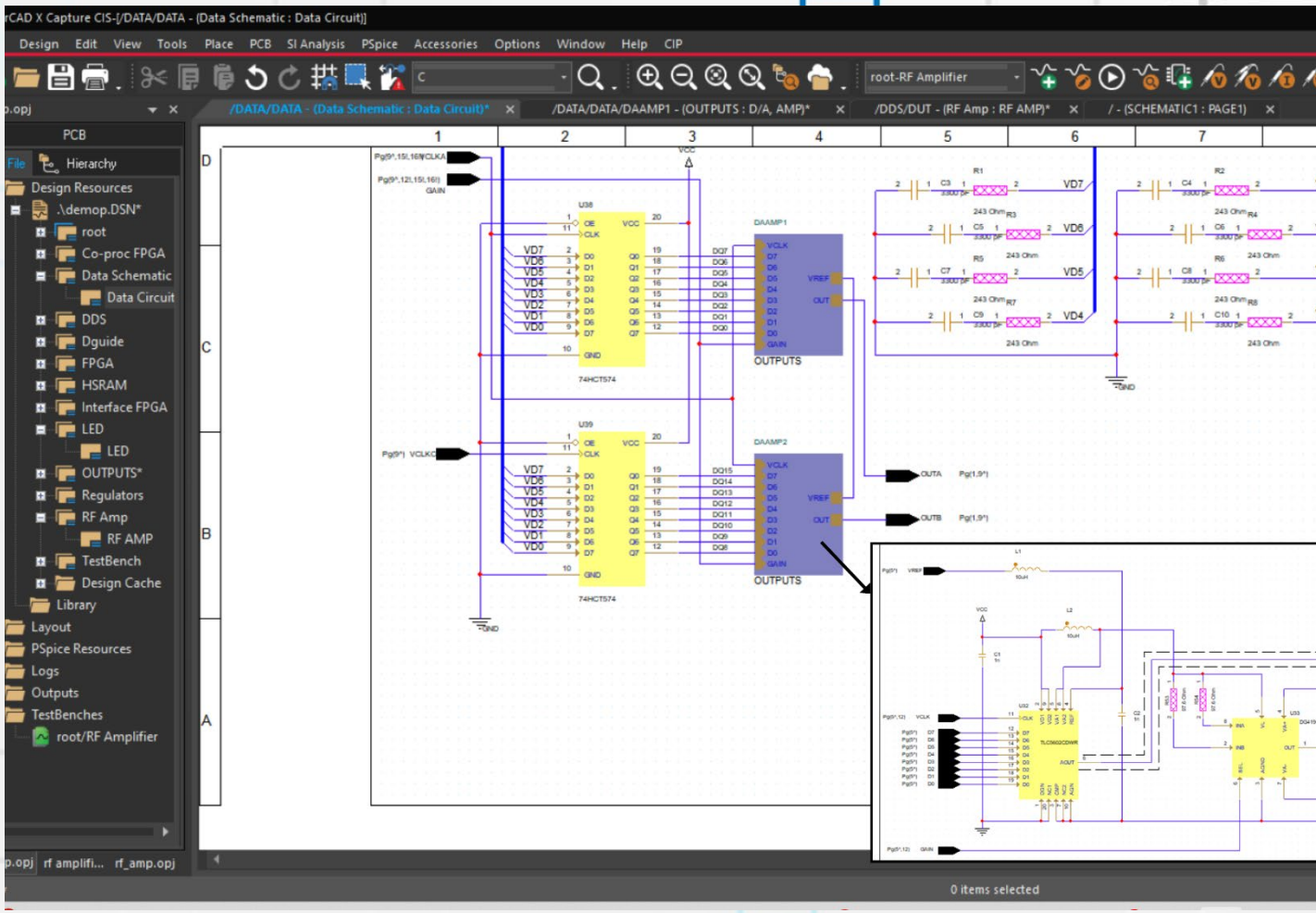
- Embedded Markup Layer
- Like GoogleDocs
- Stored in PCB database
- Commenting, Resolve, history tracking



SCHEMATIC CAPTURE

Streamlined Design Capture

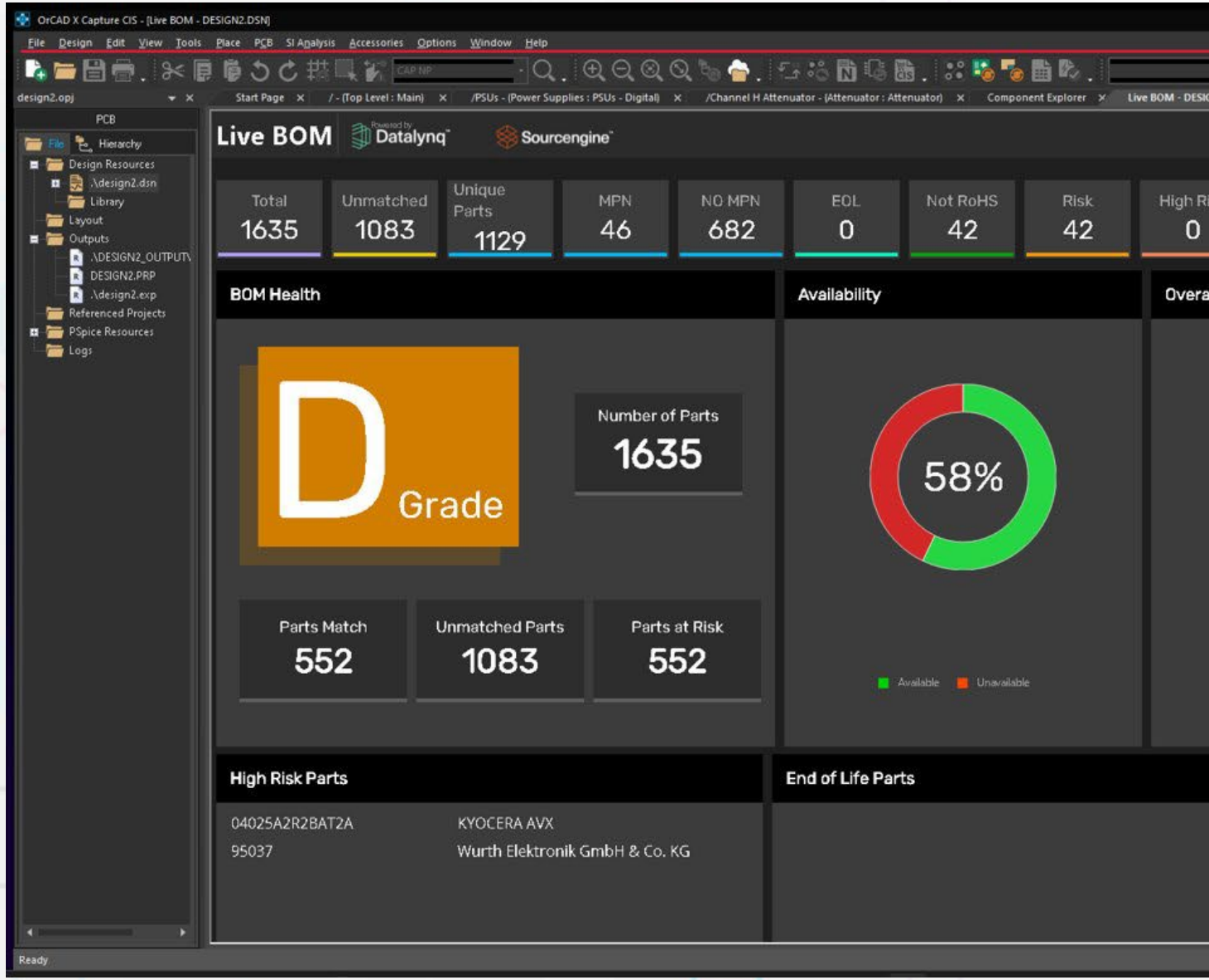
- Hierarchical Design
- Constraint Definition
- Real-Time DRC
- Connected to PCB and Simulation



SUPPLY CHAIN

LiveBOM

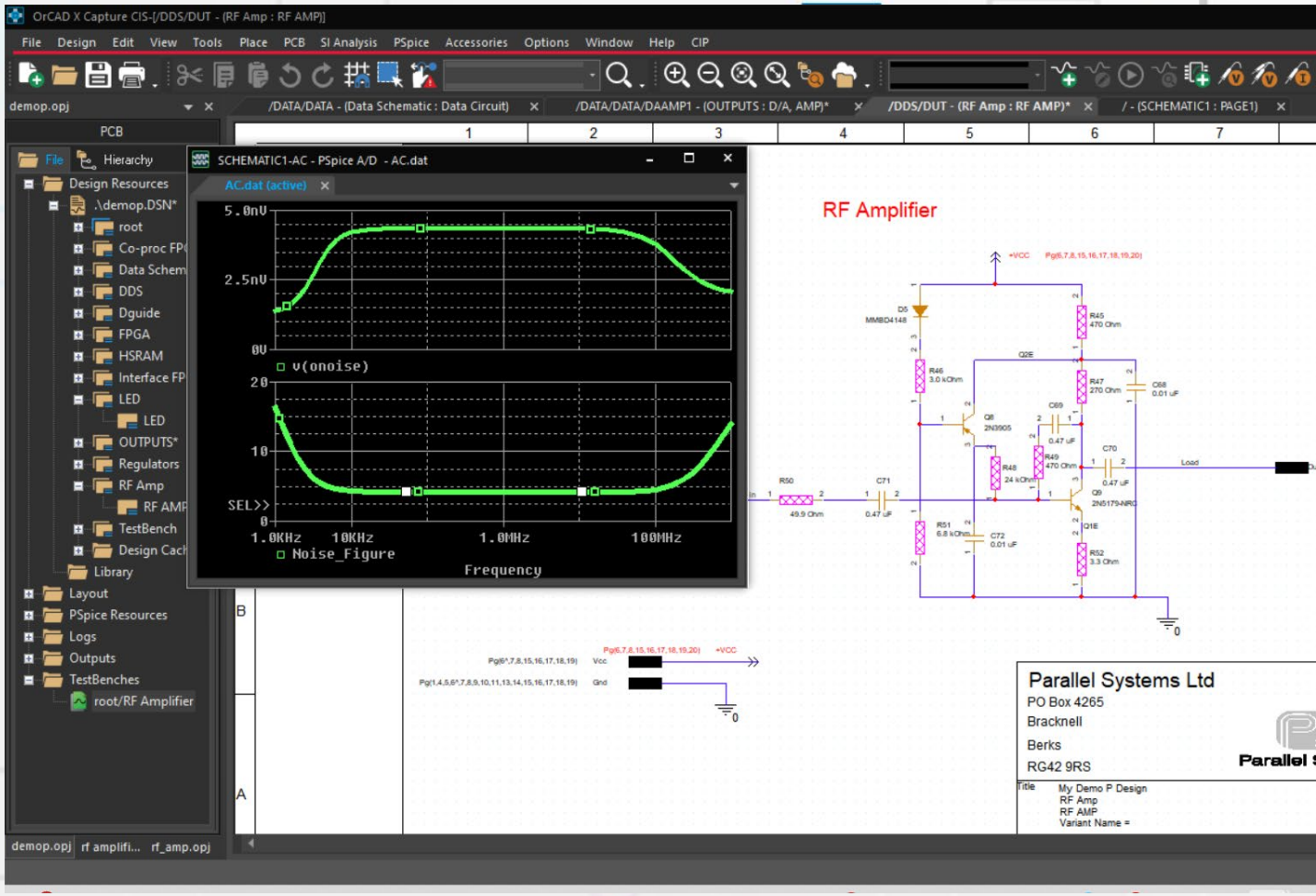
- On-demand supply chain intelligence
- Reviews and provides a grade
- Swap and update parts quickly as needed
- Ensure a compliant and orderable BOM
- Available via Cloud or On-Prem



SHIFT LEFT

Embedded SPICE Analysis

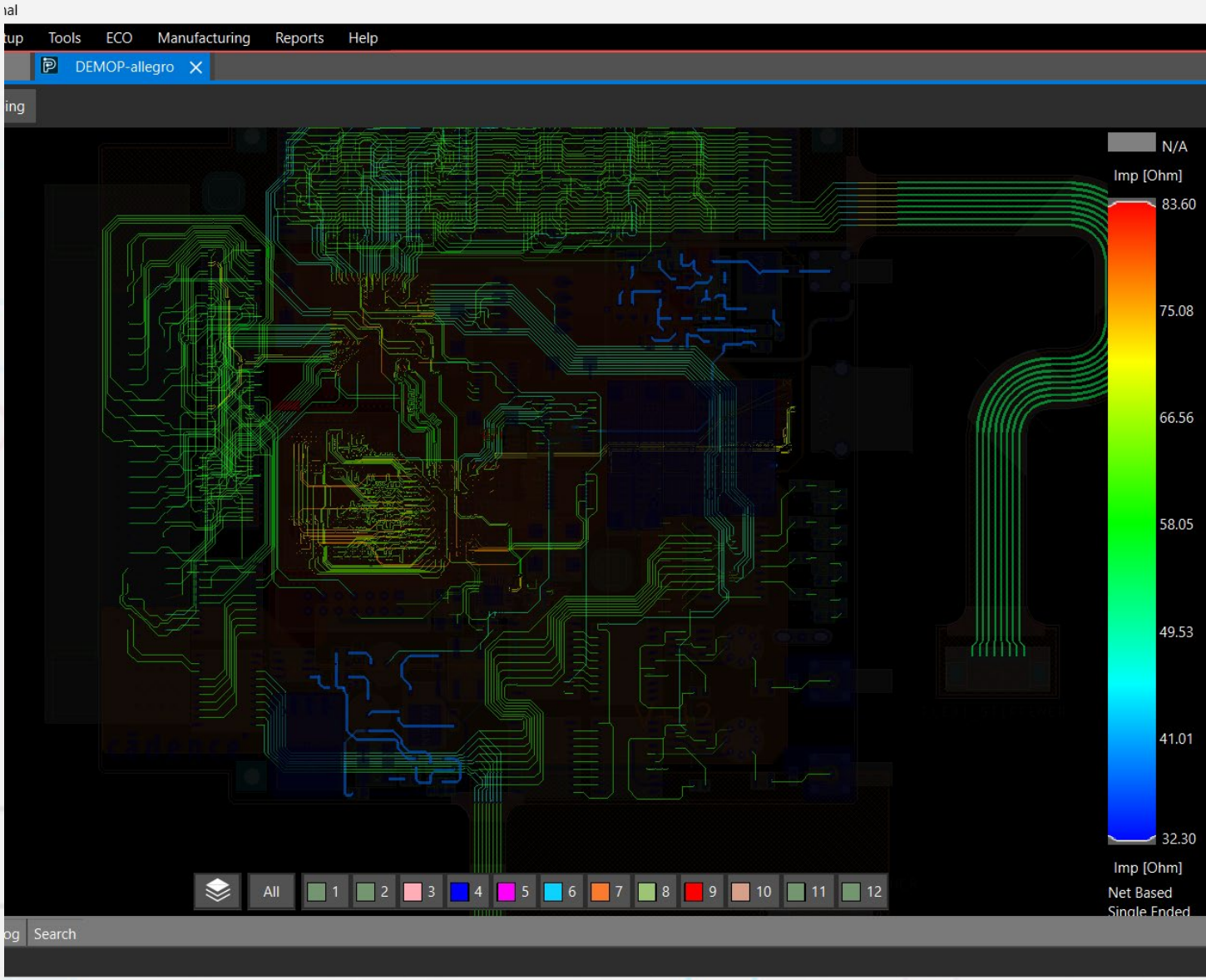
- Run SPICE analysis inside your PCB design environment
- PSpice Testbench functionality to partition design for sim & experimentation
- Perform reliability, yield, stress, and optimization analysis



SHIFT LEFT

In-Design Analysis

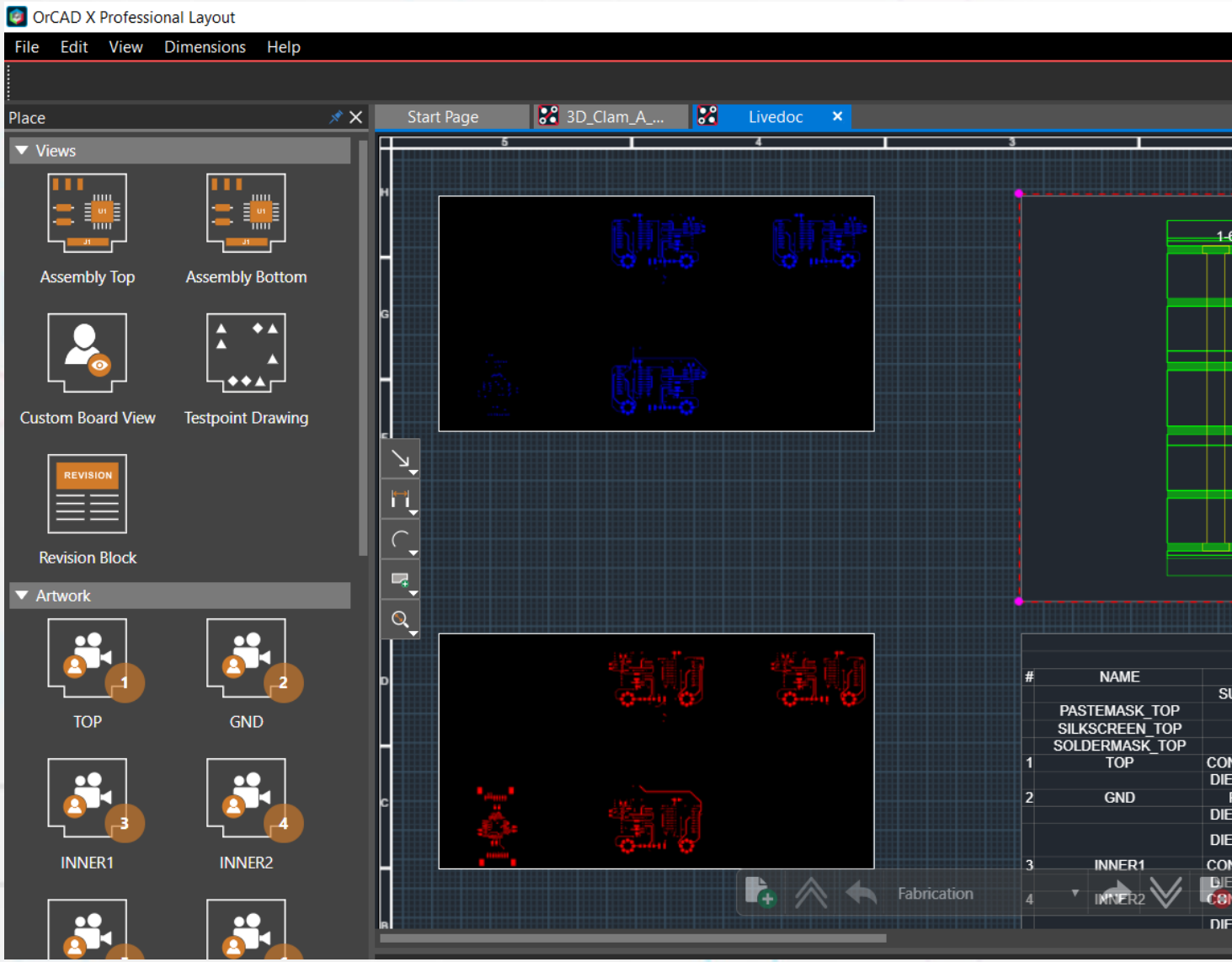
- Perform electrical analysis inside the design canvas
- Visual overlays make finding and fixing issues quick & effective
- Analysis to cover:
  - Impedance
  - Coupling
  - IR Drop
  - Crosstalk
  - Return path
  - Thermal (coming soon)



DOCUMENT

LiveDoc

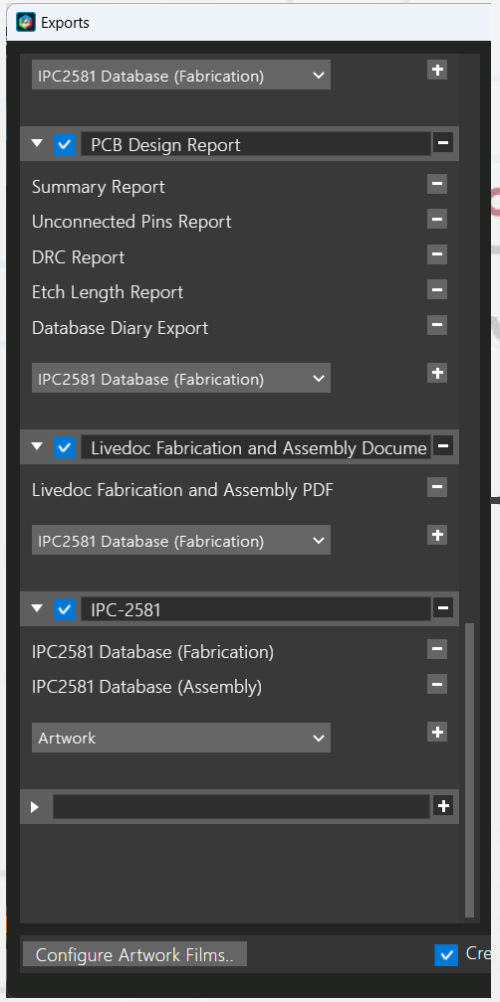
- Automated PCB Documentation
- Live Updates
- Template Driven
- Ensure docs are complete, up to date and ready

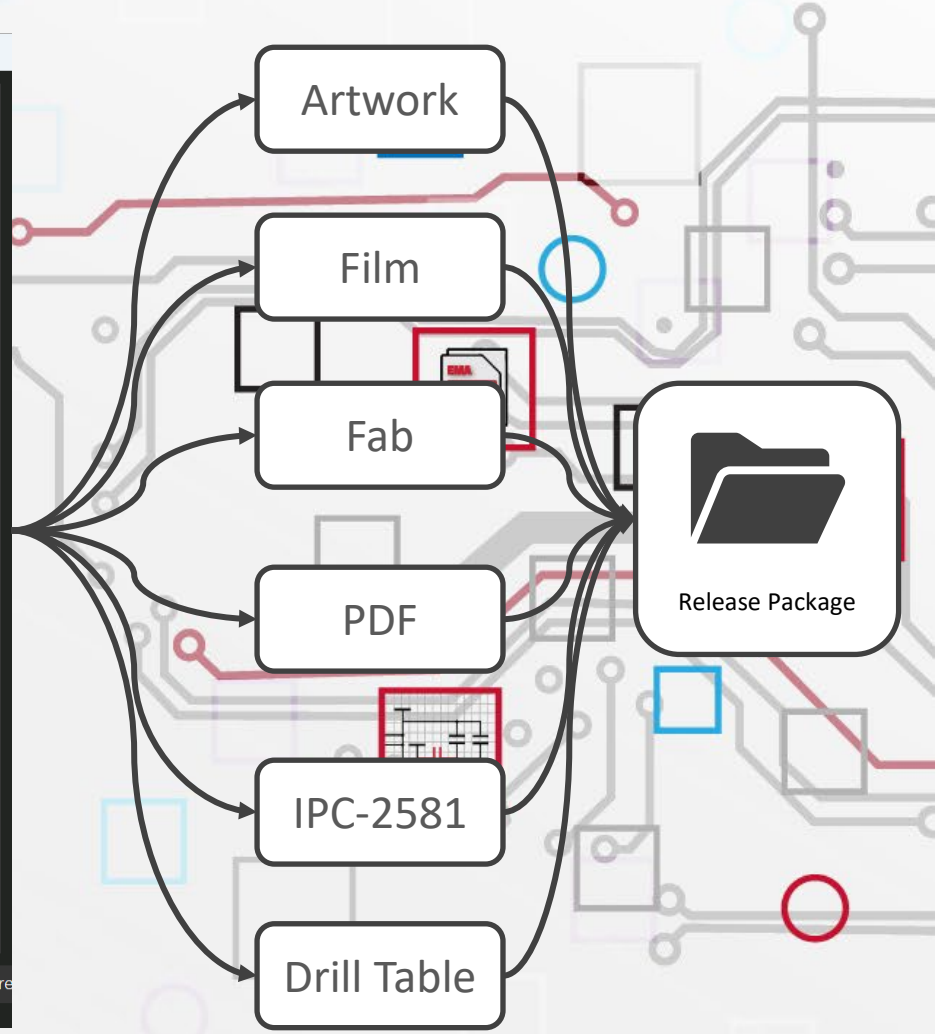


RTM PACKAGE

Release Packager

- Define & Customize Release Package
- All files & reports generated and placed in Zip file for delivery
- Template driven, always based on latest design data

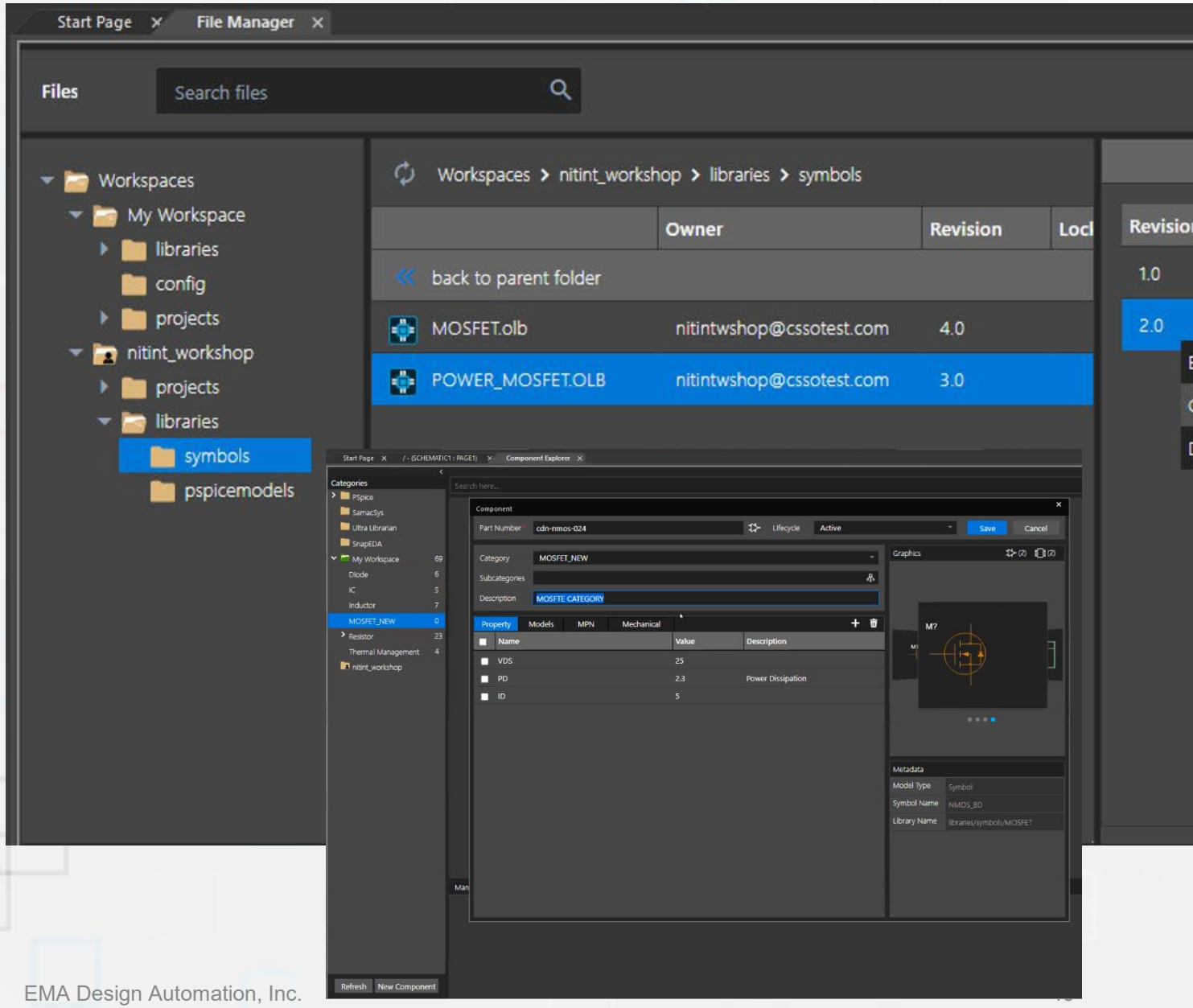




CLOUD

Workspaces

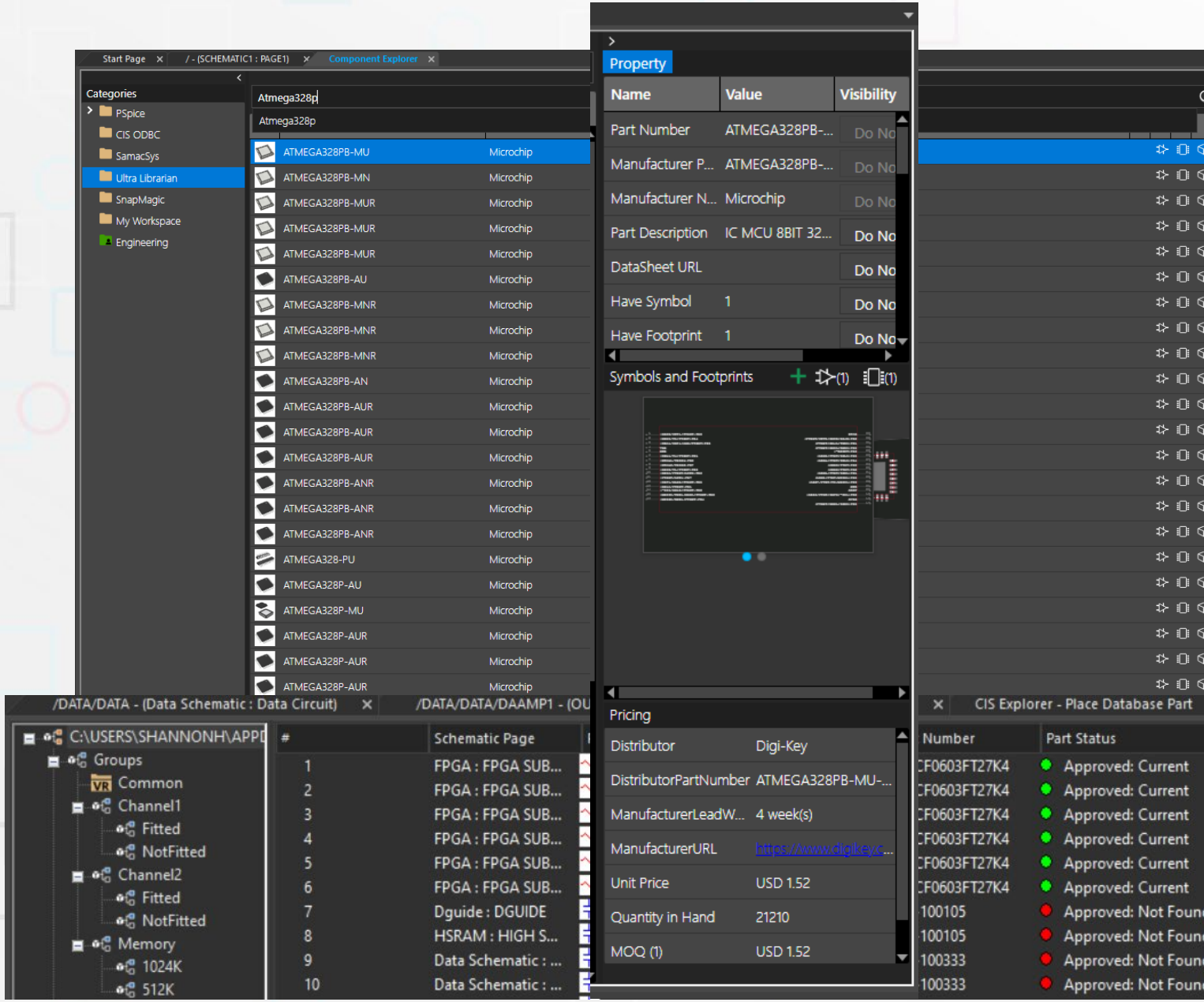
- Cadence Cloud Repository
- Store and share design files and libraries
- No setup and config required



Library & Modeling

Unified Libraries (CIS)

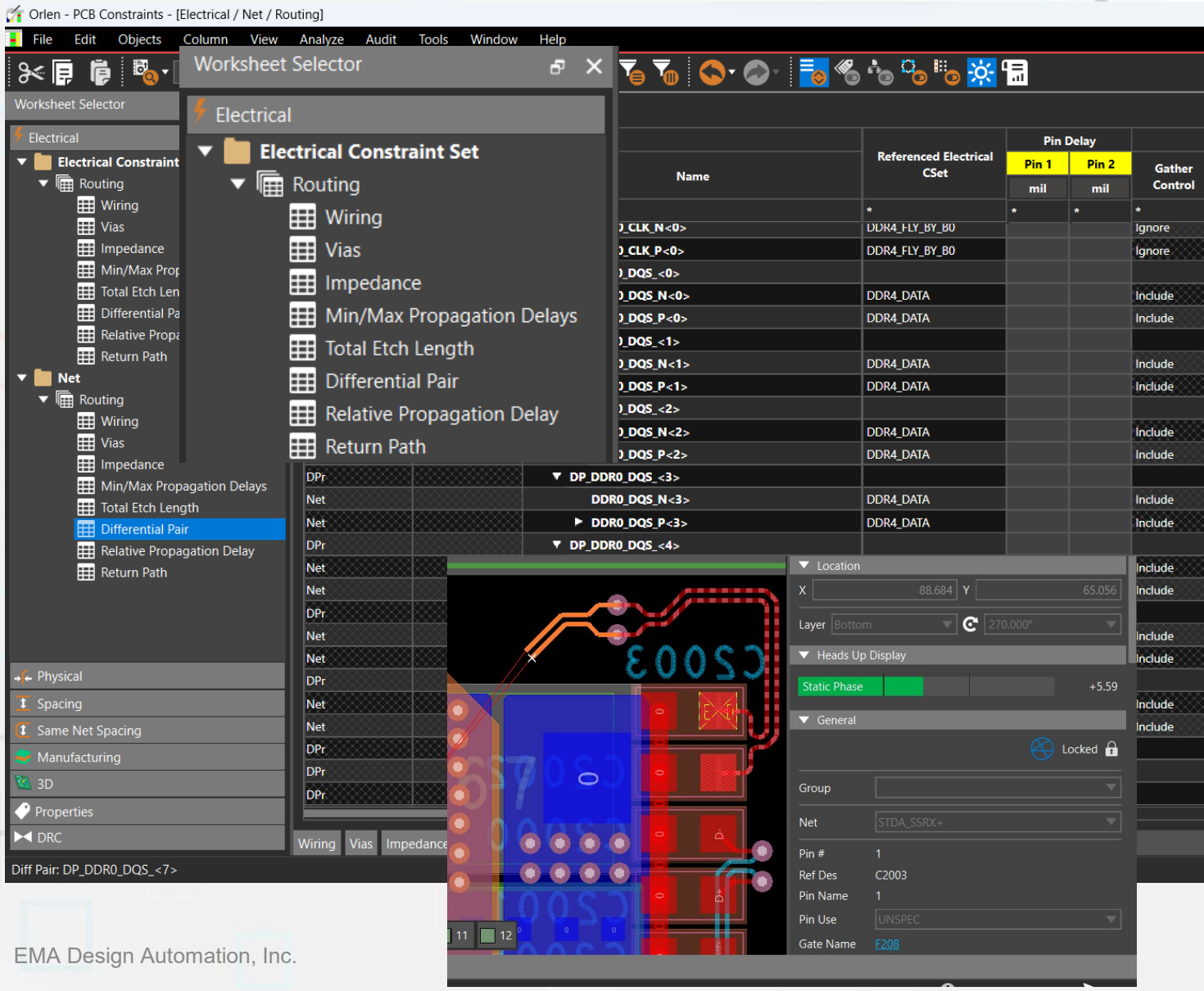
- Geometries & Parametrics
- Discoverable & shareable
- Track status & updates
- Connect to internal & external data sources
- Cloud & On-prem options



CORRECT BY CONSTRUCTION

Constraint Management

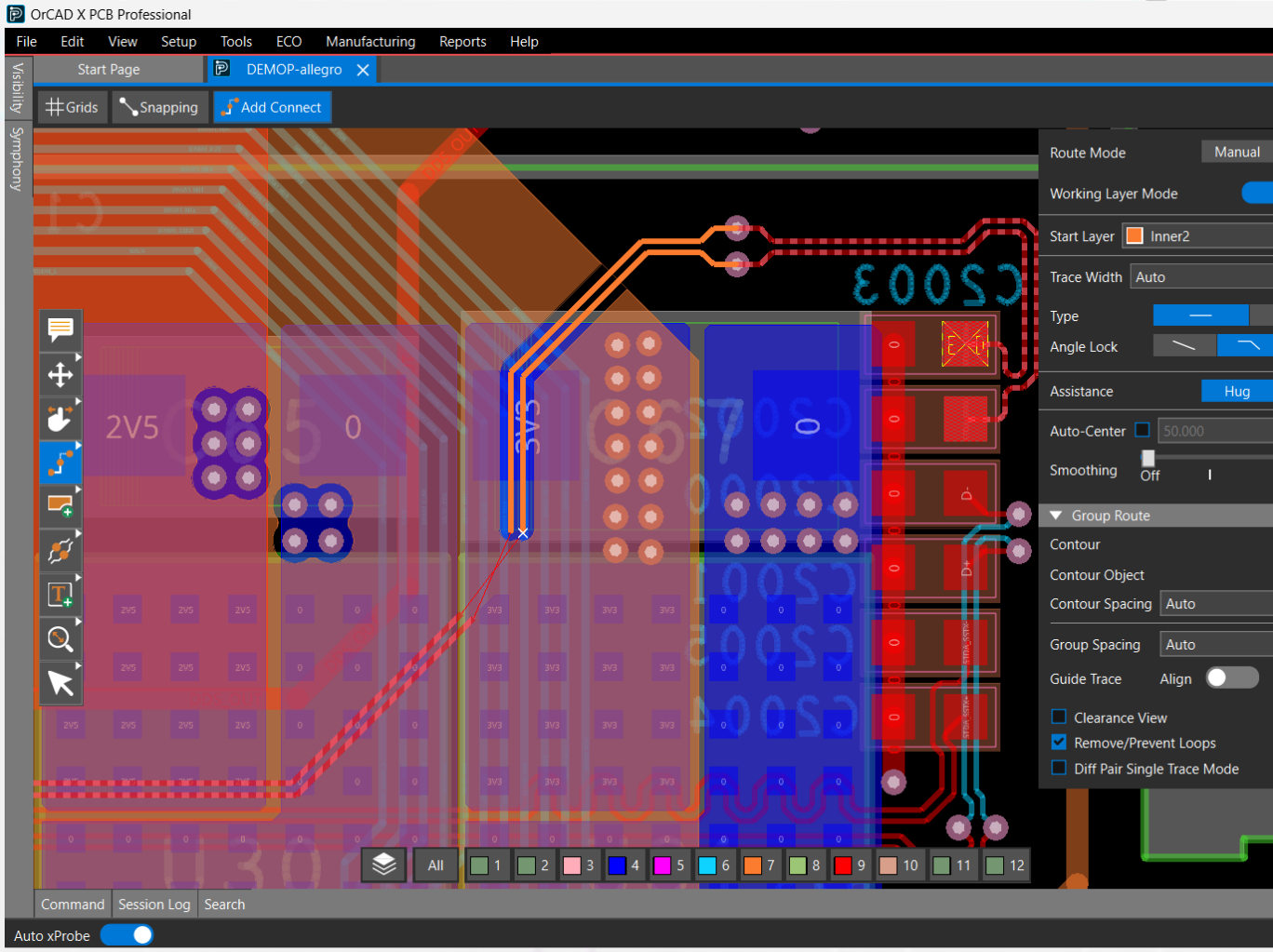
- Shift –Left with Full constraints at all levels
- View and set rules regardless of tier
- Ensure correct by construction design
- Physical, Spacing, Electrical Rules, DFM, 3D Constraints
- Real-Time Feedback



REAL-TIME FEEDBACK

Dynamic Shapes by Default

- All shapes are dynamic self healing by default
- No need to hide or re-pour
- Know impact of shape adjustments as they happen
- Freeze shapes only for special use cases



CORRECT BY CONSTRUCTION

DesignTrue DFM

- DFM as you design
- Instantly see issues
- Make RTM a signoff step
- Integrate rules from popular CMs (DesignTrue Portal)