



DesignTrue DFM Ecosystem

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Cadence Design Systems
PCB Carolina
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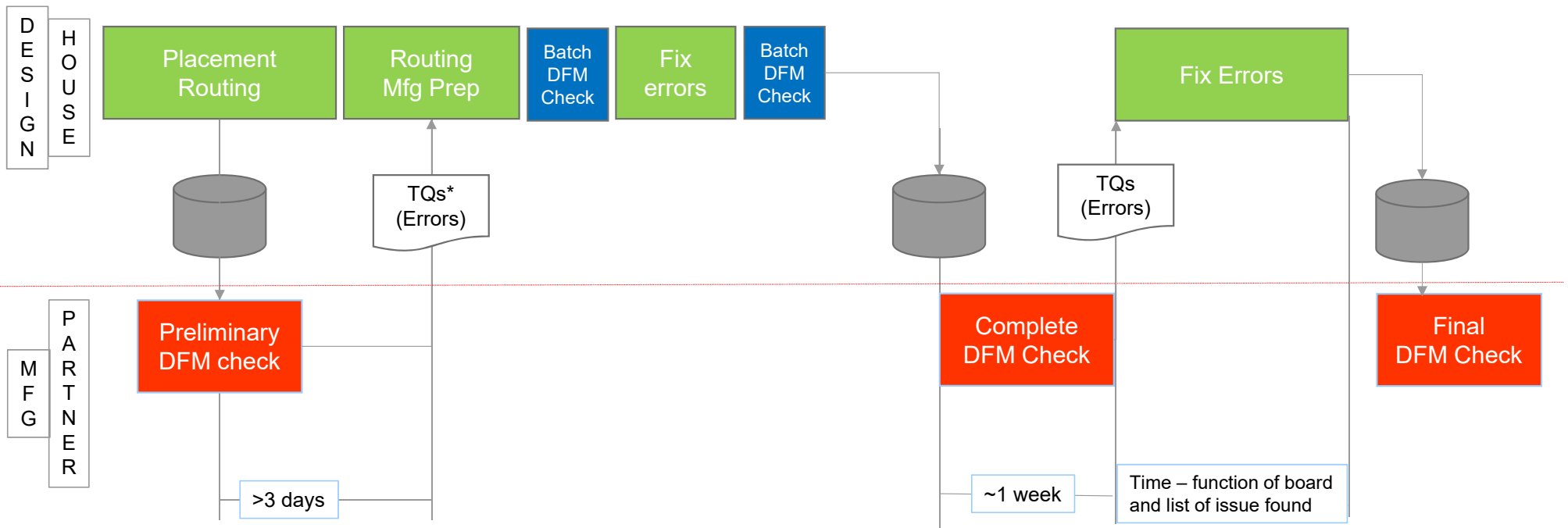
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Traditional Sign-off Process

Typical DFM / NPI process

- Unnecessary iterations with the manufacturing partners
- Lots of pressure because it is the LAST step before the product can be built / shipped



What's wrong with this process?

- Most common issues are found late in the process
- Communication delays for issue notification
- Once corrected, verified again
- Causes delays in release to manufacturing
- Interruption of work in progress

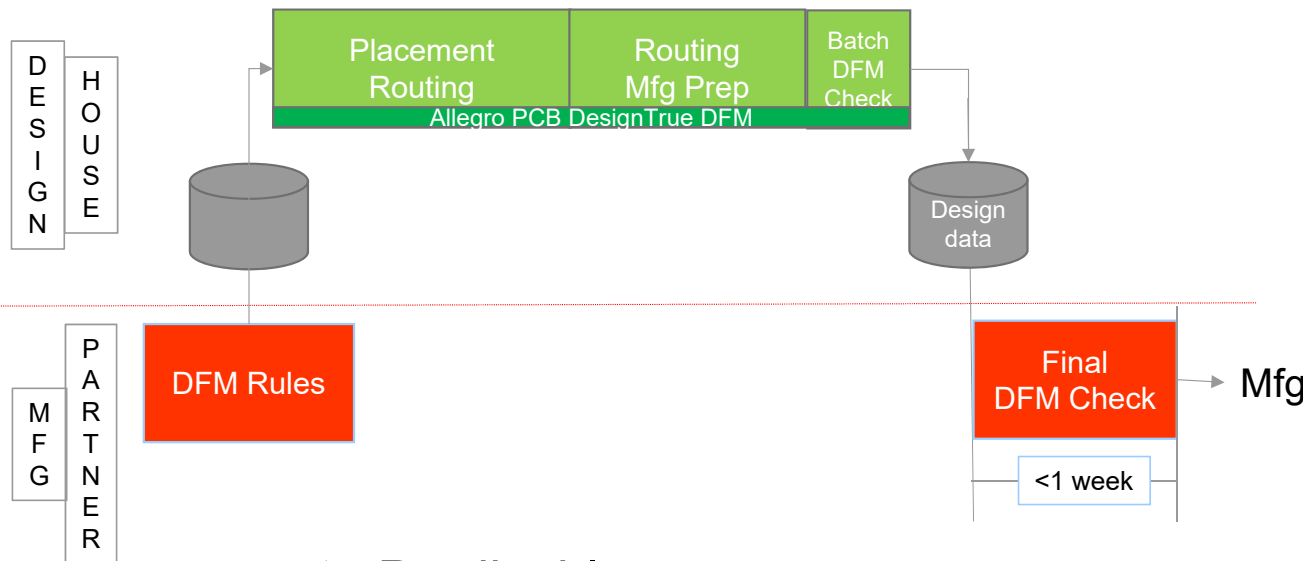




Efficient Sign-off Process

NPI Process with Allegro PCB DesignTrue DFM

Manufacturing rules-driven design



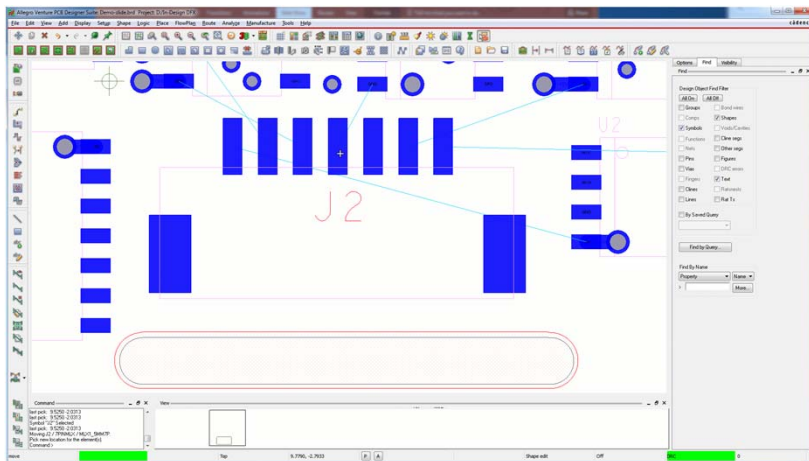
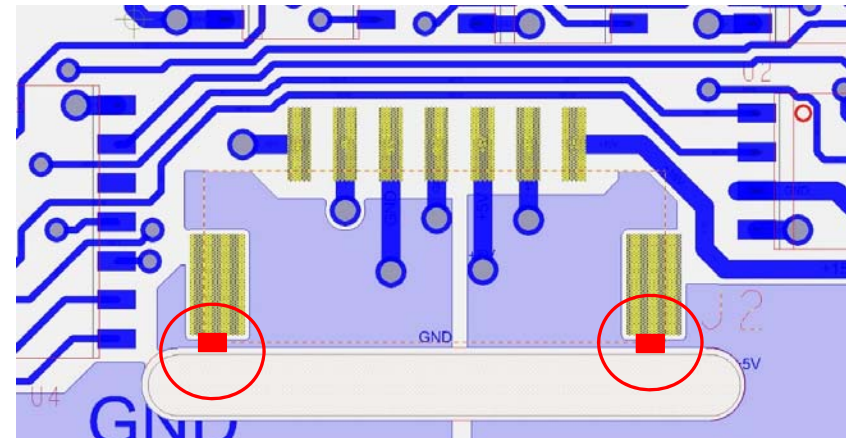
- Predicable process
- Much shorter design cycle
- Faster product introduction

- Allegro® PCB DesignTrue DFM provides
 - DFF and DFA rules
 - Over 2000 advanced checks independent of electrical rules
- Real-time checks as you design
 - Signoff with confidence
 - Save at least one day per iteration
- Ensures design is ready for manufacturing
 - While shortening the development cycle
- Easy to use, reuse, and apply selectively, exclusively, or globally

Common DFM Issues

Copper pin to Cutout

- Found at Sign-off
 - Requires major re-work to correct
 - Delays release schedule
 - May introduce more errors

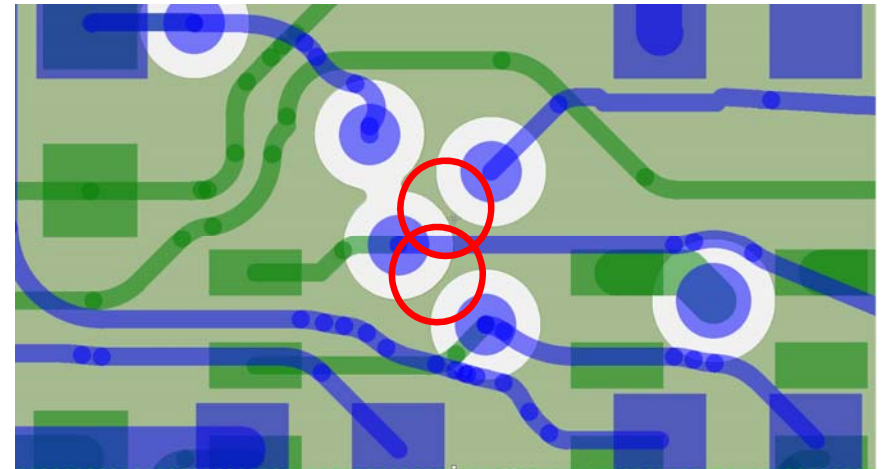
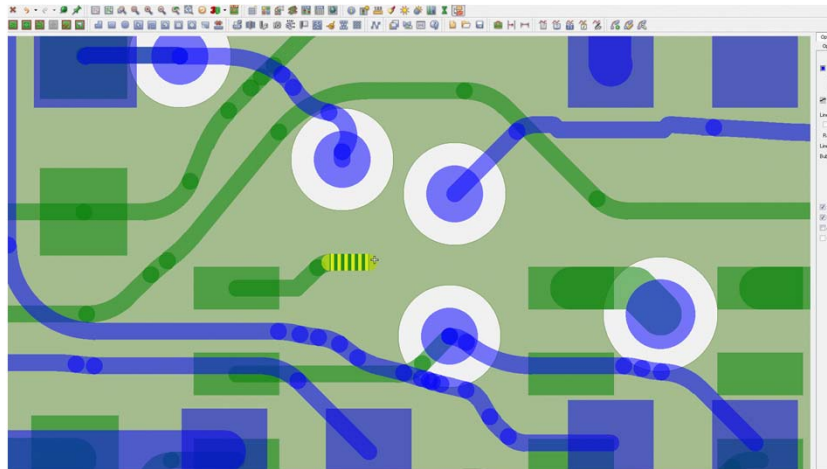


- Found during placement:
 - no re-work required
 - Not the cause for delay to release schedule

Common DFM Issues

Copper Slivers

- Found at Sign-off
 - Requires major re-work to correct
 - Delays release schedule
 - May introduce more errors



- Found during editing:
 - Identified and corrected while editing
 - Not the cause for delay to release schedule

Design for Manufacturing Checks

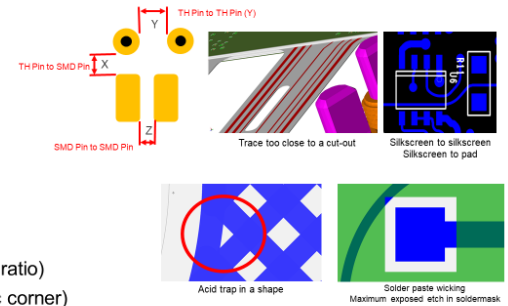
All areas of PCB manufacturing

- Etching
- Lamination
- Drilling
- Plating
- Solder masking
- Silk screening
- Assembly
- Test

Design for Fabrication (DFF) Checks

Complete list of checks

- Outline
- Mask
- Annular ring
- Copper spacing
- Silkscreen
- Holes
- Copper features
- Back-drilling
- Analytics (ex. hole aspect ratio)
- Rigid-flex features (ex. arc corner)



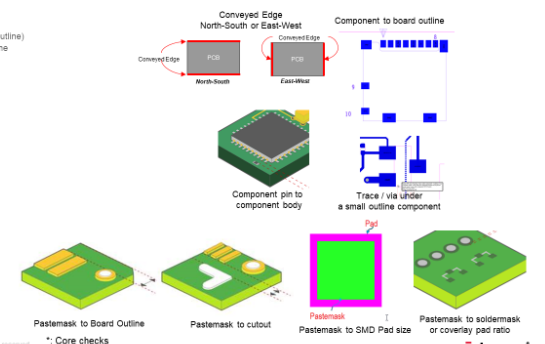
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Design for Assembly (DFA) Checks (QIR6)

Extensive checks for assembly process

- Outline checks
 - Component to board outline*
 - Tall component conveyed edge (board outline)
 - High pin-count component to board outline
- Component checks
 - Component pin to component body*
 - Edge finger to component body
 - Mechanical hole to component body*
 - Via under a small outline component
 - Trace under a small outline component
- Fiducial checks
 - Fiducial to component body
 - Number of fiducials per footprint
 - Inside/outside body location checks
- Pastemask checks*
 - Pastemask to outline / cutout check
 - Pastemask to pastemask check
 - Pastemask to via pad check
 - Pastemask size to SMD pad size
 - Missing pastemask for SMD pins
 - Pastemask to soldermask pad ratio
 - Pastemask to coverlay pad ratio



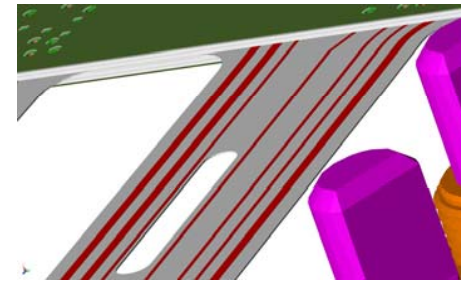
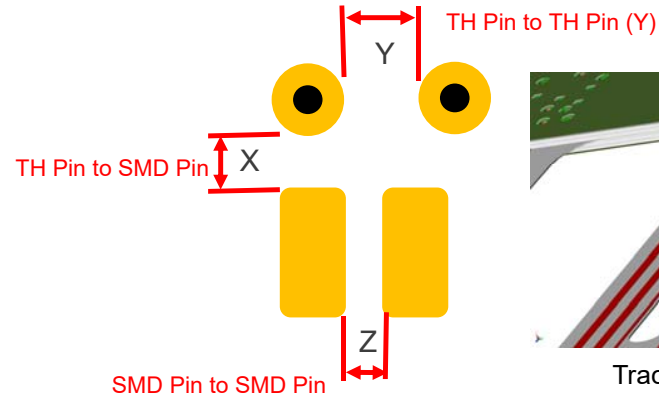
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* Core checks
All other checks: advanced checks

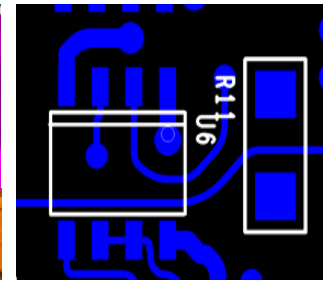
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Over 2000 rules for DFF alone

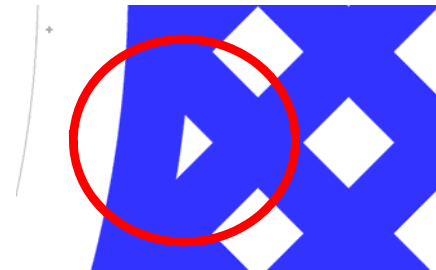
- Outline
- Mask
- Annular ring
- Copper spacing
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- Copper features
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Trace too close to a cut-out



Silkscreen to silkscreen
Silkscreen to pad



Acid trap in a shape



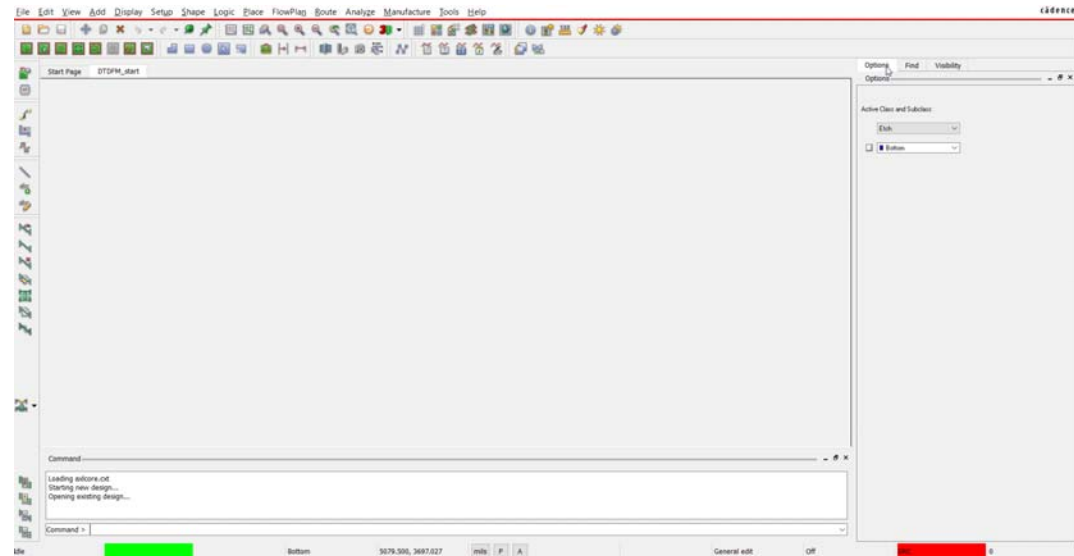
Solder paste wicking
Maximum exposed etch in soldermask



Defining Checks

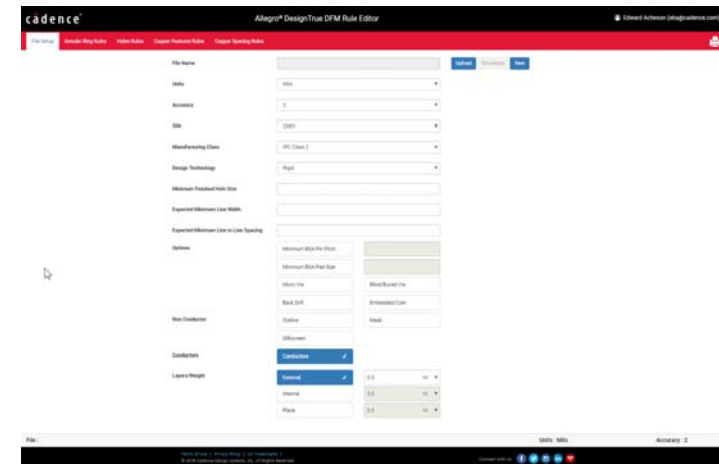
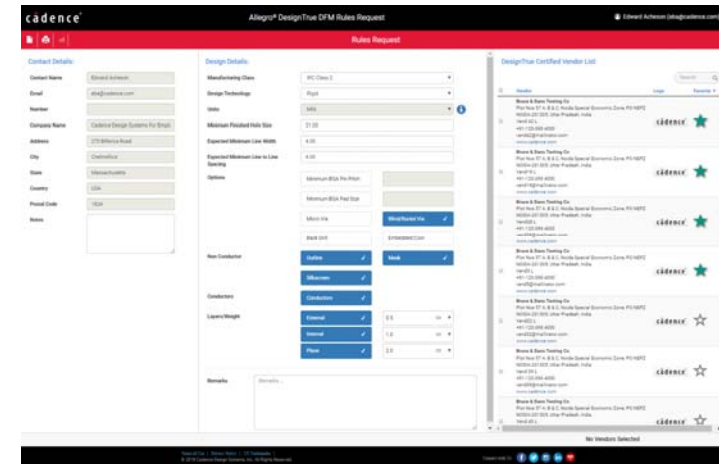
When Should DFM Checks Start?

- Know Board Requirements
 - Technology needs
 - Materials, stack-up
 - Manufacturing Specifications
- Work with Fabricator
 - Understand their capabilities
 - Communicate design details
 - Request stackup, rules.



New DesignTrue DFM ecosystem

- Web Based Rules Creation and Request System
 - PCB Fabricators Create rules sets
 - Facilitates in OEMs Request for Rules
- Enable customers to
 - See which PCB manufacturing companies support DesignTrue DFM rules
 - Request DesignTrue DFM compatible rules from manufacturing partners
- Enables PCB fabricators to
 - Provide DFM Rules to Allegro customer in the Allegro Technology File format
 - Visibility to Allegro users for potential opportunities



DesignTrue DFM ecosystem OEM View

- Cadence Support Login Required
 - Must be a Cadence customer to obtain access
 - Secure connection
- Request DFM Rules
 - Provide Design Details
 - Provides contact details
 - Select which PCB Fabricators from a list of DesignTrue fabrication partners
- Fabricator supplied rules
 - In native Allegro Technology File Format
 - Imported directly into Allegro/OrCAD tools

The screenshot shows the 'Rules Request' page in the DesignTrue DFM ecosystem. The page is divided into three main sections: Contact Details, Design Details, and DesignTrue Certified Vendor List.

Contact Details:

- Contact Name: Edward Achenon
- Email: eia@cadence.com
- Number: [Empty]
- Company Name: Cadence Design Systems For Simpki
- Address: 275 Billerica Road
- City: Chelmsford
- State: Massachusetts
- Country: USA
- Postal Code: 01824
- Notes: [Empty]

Design Details:

- Manufacturing Class: IPC Class 2
- Design Technology: Rigid
- Units: MILS
- Minimum Finished Hole Size: 21.00
- Expected Minimum Line Width: 4.00
- Expected Minimum Line to Line Spacing: 4.00
- Options:
 - Minimum BGA Pin Pitch: [Empty]
 - Minimum BGA Pad Size: [Empty]
 - Micro Via: Micro Bumped Via (checked)
 - Back Drill: Embedded Con (checked)
- Non Conductor:
 - Outline: (checked)
 - Mask: (checked)
- Conductors:
 - Conductors: (checked)
- Layers/Weight:
 - External: (checked) 0.5 oz
 - Internal: (checked) 1.0 oz
 - Plene: (checked) 2.0 oz
- Remarks: [Empty]

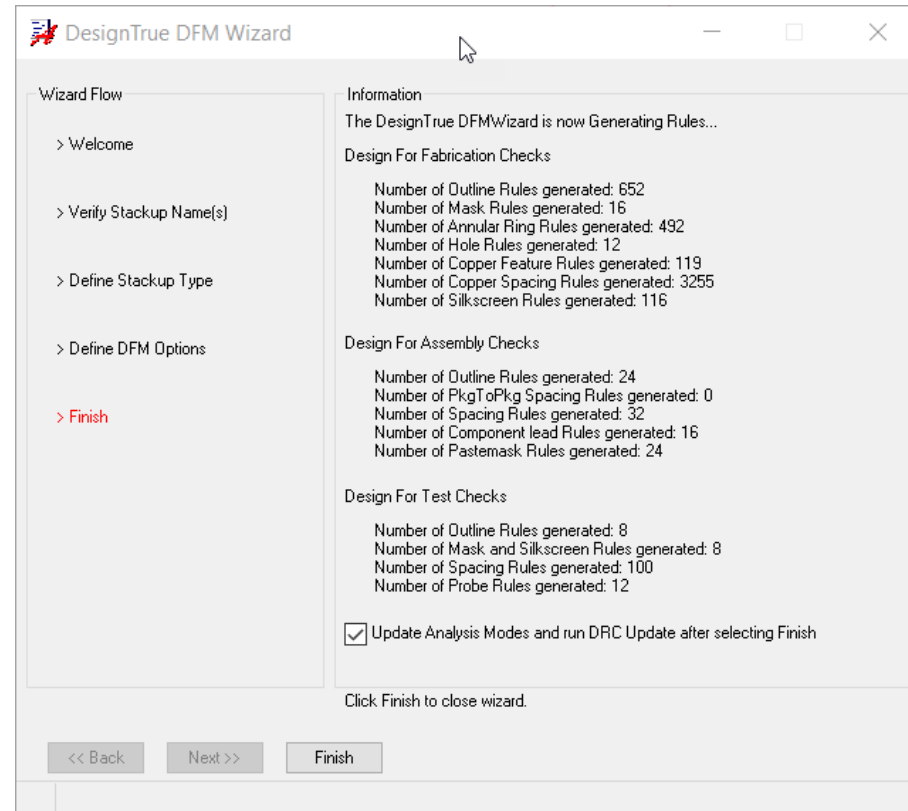
DesignTrue Certified Vendor List:

The list shows several vendors, all of whom are 'Brose & Dams Testing Co.' with various addresses and phone numbers. The vendors are listed with their names, addresses, phone numbers, and logos. The list is currently empty, and a message at the bottom states 'No Vendors Selected'.

DesignTrue DFM ecosystem

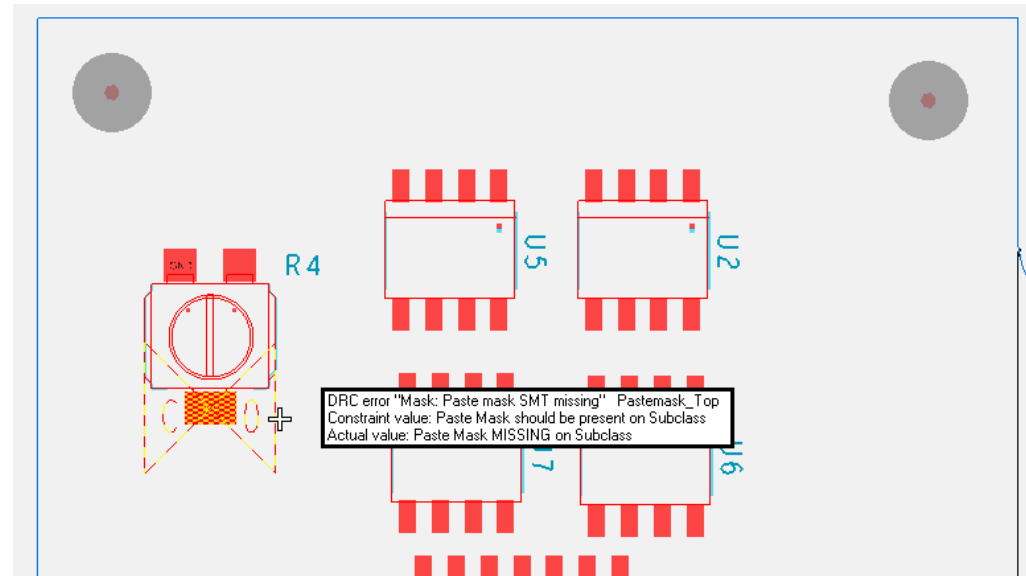
DesignTrue DFM Wizard

- Reads Design Stackup
- Rule Template Driven
- Generates Constraint Sets
- Applies Constraints to appropriate Layers



Now Design Works Begins

- Online Violation Detection
 - Fix it as it occurs
 - No delays in extracting data for checks
 - No delays in waiting from external process to finish
 - No reports to muddle through





Summary

Summary

- Real-time, integrated DFM solution
 - On-line solution not batch oriented
 - Consistent with constraint driven design flow
 - Focused on manufacturability from Fabrication to test.
- Work with Fabricator early in the process
 - Get rules before start of design
 - Early communication will results in better productivity
- Fewer iterations between Design and Sign-off
 - Reduction in release to manufacturing time

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