

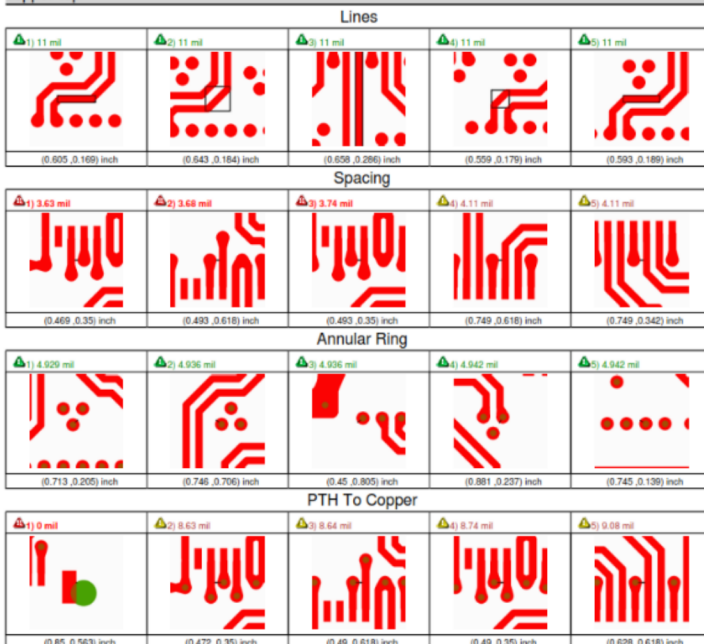
# DFM *Design For Manufacturing*

Before requesting a PCB quote, meticulously review design requirements, ensuring accurate specifications. Only provide necessary information to avoid confusion and extra costs. Confirm order specs align with the design to prevent manufacturing discrepancies.

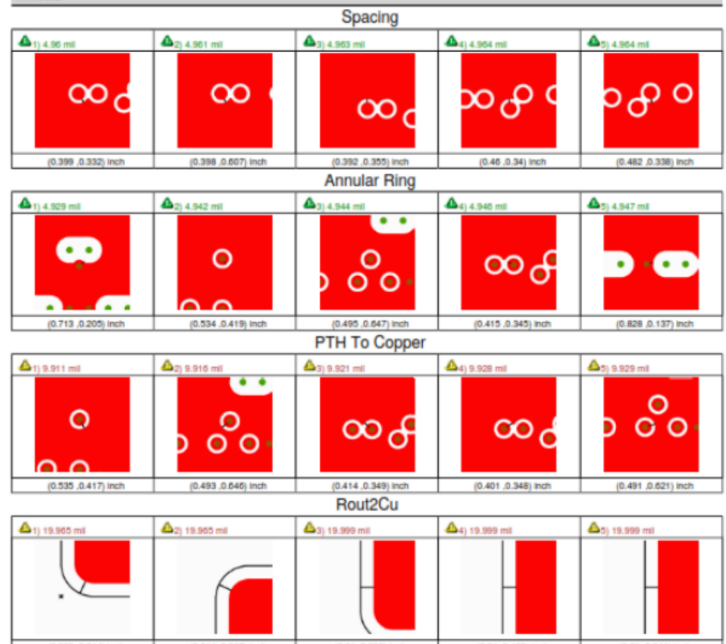
Utilize manufacturer-offered CAD tools for DFM rule checks to avoid delays.

In the CAM department, design files undergo scrutiny, order parameters verification, engineering reviews, and manufacturing sequence creation. A proficient CAM team not only ensures accurate production but also seeks improvements in functionality, cost reduction, and risk mitigation. Meticulous attention at each step guarantees the realization of the desired board.

copper-top



mixed5



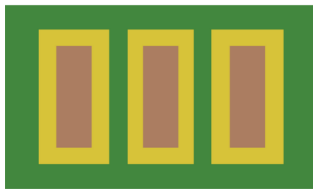
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# DFM *Design Considerations*

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CAM changes often involve solder mask edits. Though seemingly simple, optimizing mask layers for solderable features requires careful considerations to prevent solder bridge shorts.

Challenges arise from varied solder mask rules in electronic footprints, causing different rules for each component. An effective approach is implementing a global setting in the design tool, adding standard clearances. CAM toolers with manufacturing expertise make logical edits, ensuring process variations while adhering to specifications like IPC-A-600, preventing unwanted violations for functional parts.



## With Dam

Individual Relief around pads resulting in mask between pads. Spacing between copper pads must be 8 mils or more.



## Without Dam

Block relief with no mask between pads due to not enough space for clearance and minimum print width.

Adjust traces to increase distance from adjacent features, preventing potential shorts. Verify with DRC check in the CAD tool before submission.



Adequate space between components with "fingers" is crucial, with a recommended 4 mil soldermask dam between SMT pads. Note that 1 mil is a milli-inch (1/1000 inch), not a millimeter. These practices enhance board functionality and durability in modern manufacturing processes.

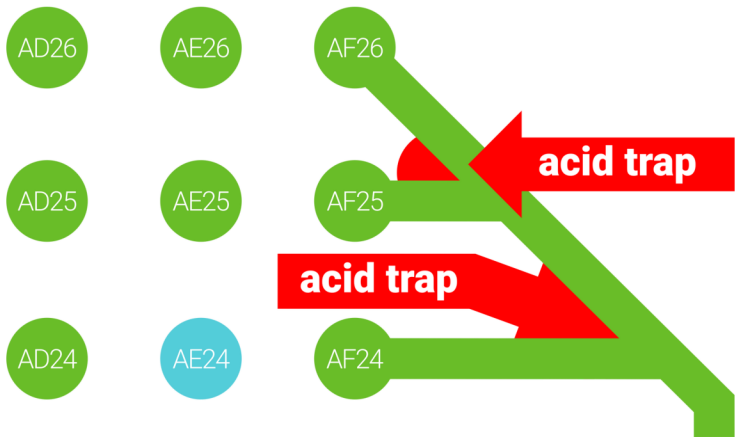
Designers should prioritize wide traces and spaces in designs for optimal performance. While some traces may require narrower width or spacing, it's essential to avoid uniform treatment for all traces.



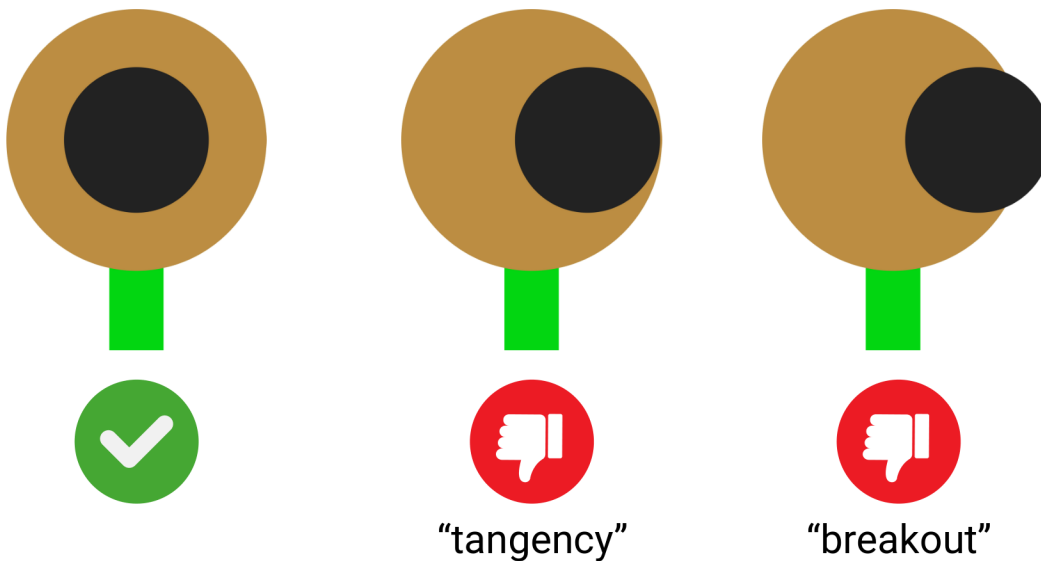
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Acid traps, formed by acute angle trace connections, used to cause concern for corrosion of the traces due to acidic chemistry trapped in these spots during the manufacturing process. These are no longer a concern for corrosion due to updated chemistries and photoresists, but best practice for design should limit these types of connections when possible.

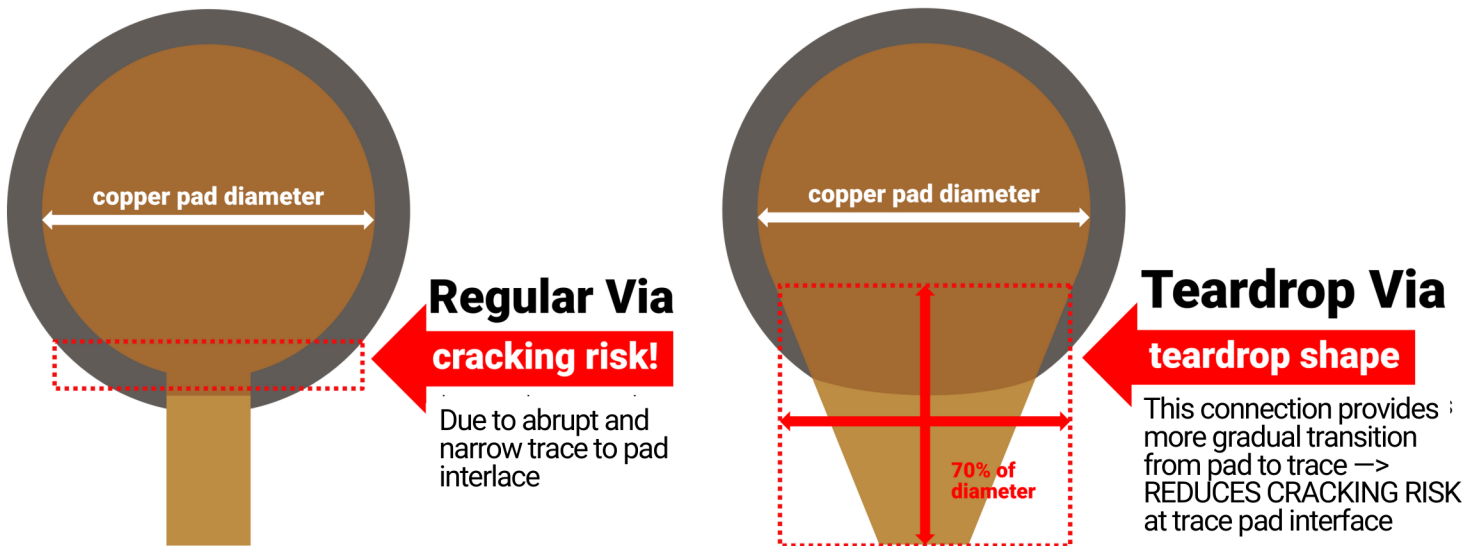


Annular ring violations occur if the via hole isn't centered on the pad, or if the ring width falls below specifications. Misalignment may cause unreliable connections with higher resistance, potentially leading to reliability issues.



# DFM *Design Considerations*

Enlarge through-hole pad for annular ring compliance, enhance success by adding teardrops to the pad-trace junction.



## Other ways CAM can update your files for better manufacturability

- Bumping up the size of all of the copper features by adding an “etch comp” (compensation) to ensure that traces—especially thinner traces—will finish closer to the design specifications after they are etched.
- Removing copper pads on non-plated holes to preserve hole quality.
- Adding copper thieving to external layers. This distributes the copper electroplating more evenly or to an internal layer that will improve the material thickness distribution during lamination.
- Changes to material stack-up, trace width, or spacing to control the characteristic impedance of the desired transmission lines.
- Increasing a clearance in a copper plane to allow enough space for a drilled hole to pass through without coming in contact with the plane.
- Adding a scaling factor—stretch or skew or both—to the design to allow for the inevitable movement of the material during processing.

## Remember

CAM toolers enhance manufacturing yield with minor design modifications but won't alter functionality. Designers must explicitly note unmodifiable portions in fabrication instructions.



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