An Advanced Fabrication Array Utility

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Agenda

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- Advantages & Disadvantages of Arrays
- Possible Methods
- Array Tool Requirements
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Introduction

- **An “Assembly Array” is an arrangement of one or more single PCBs on a single fabricated board.**
- **An array enables an assembly house to store and populate boards more efficiently than is possible with small individual boards.**
- **Who should design the Array?**
  - Fab house?
  - Assembly house?
  - Mechanical?
  - PCB Designer?
- **What tools are available?**

Definitions

- **PCB**
  - Individual board.
- **Array**
  - Assembly array (or pallet). As opposed to a fabrication “panel”.
- **Panel**
  - Fabrication panel. May be an “array of arrays”.

Advantages of Arrays

- Standard assembly array sizes.
- Space for tooling holes and edge conveyors.
- Less need for carriers.
- Surface mount machines run at higher efficiency.
- Fewer handling issues

Disadvantages of Arrays

- Breaking-out individual boards can be difficult and add extra cost to the assembly process.
- Large arrays with many routed slots or v-scores become weak and can add to bow and twist problems.
- Less efficient use of the fabrication panel.

Possible Methods

- Create a requirements document or diagram and ask the PCB fabricator to design an array accordingly.
- Use a 3rd-party tool such as GC-Cam CAM350 or Valor.
- Hand the problem over to the assembly house.
- Develop code in C++, Java etc.
- Develop Allegro Skill code.

Array Tool Requirements

- The user interface should be familiar to designers who will probably only use it occasionally.
- Individual (embedded) boards within the array should reference the source board rather than be a copy.
- Quick design (and re-design) of arrays.
- Re-useable.

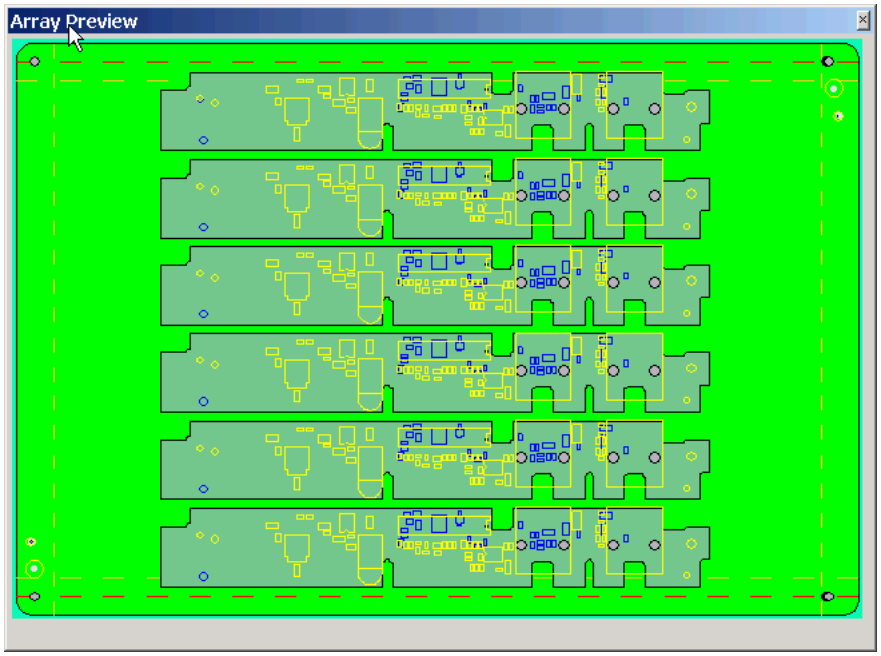
Array Specification File

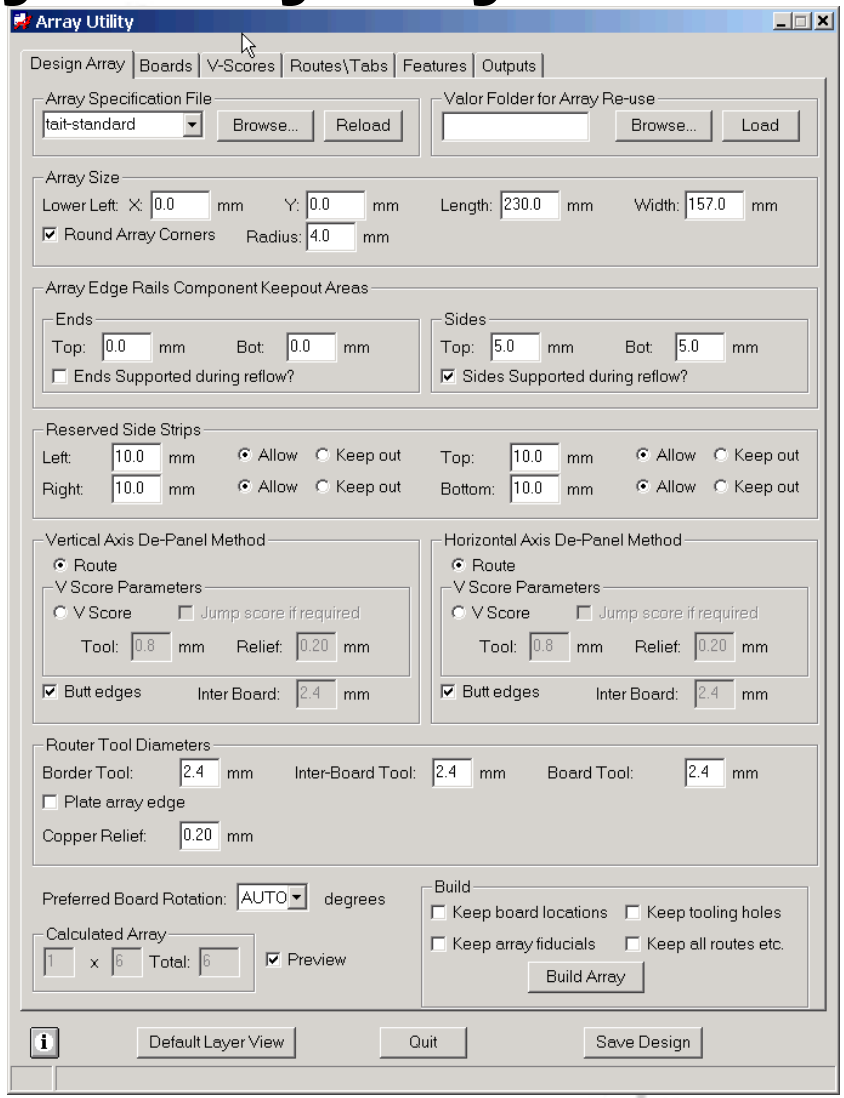
A corporate “Array Specification” file stores design data common to board technologies.

- Preferred array size
- Array edge clearance requirements
- Default routing and v-score tool sizes
- Relative locations of tooling holes and fiducials

Step 1: Preliminary Array Layout

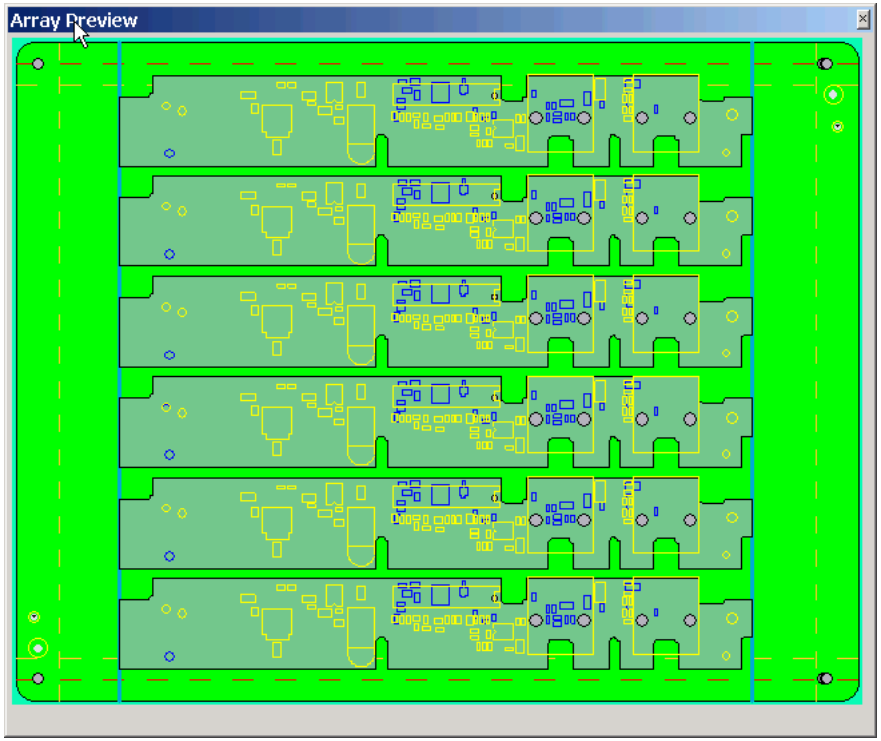
- **Standard Skill Forms**

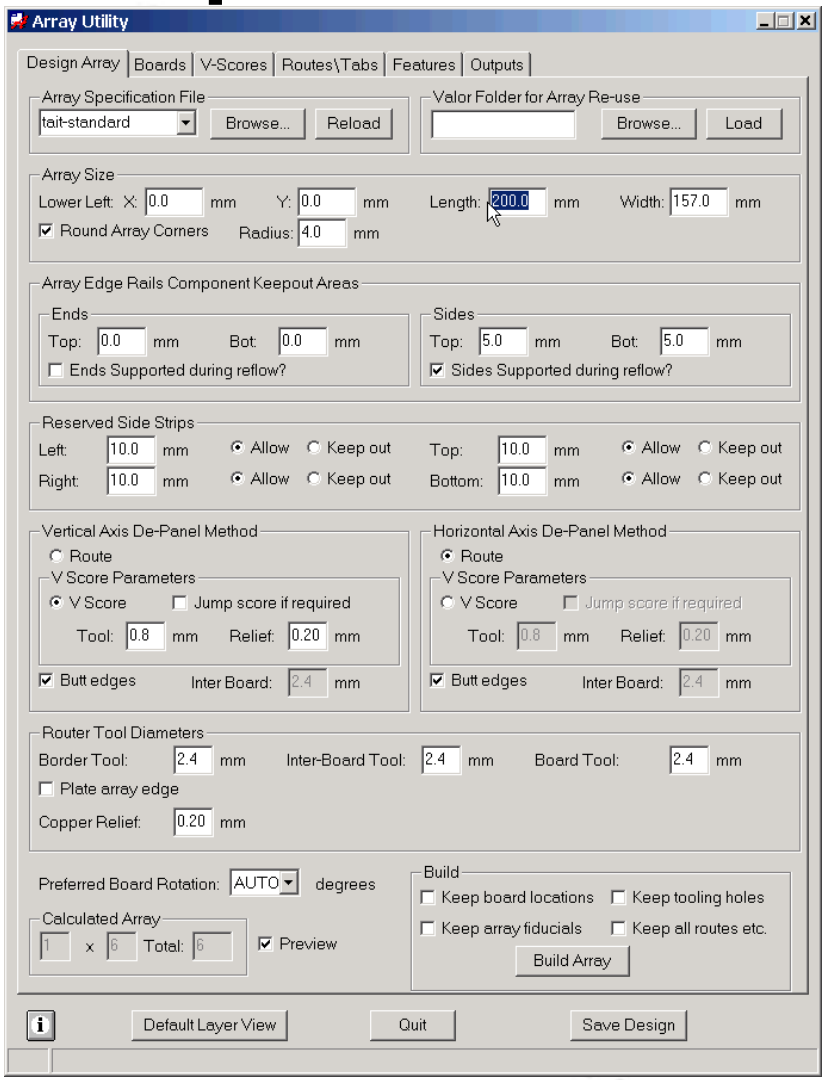




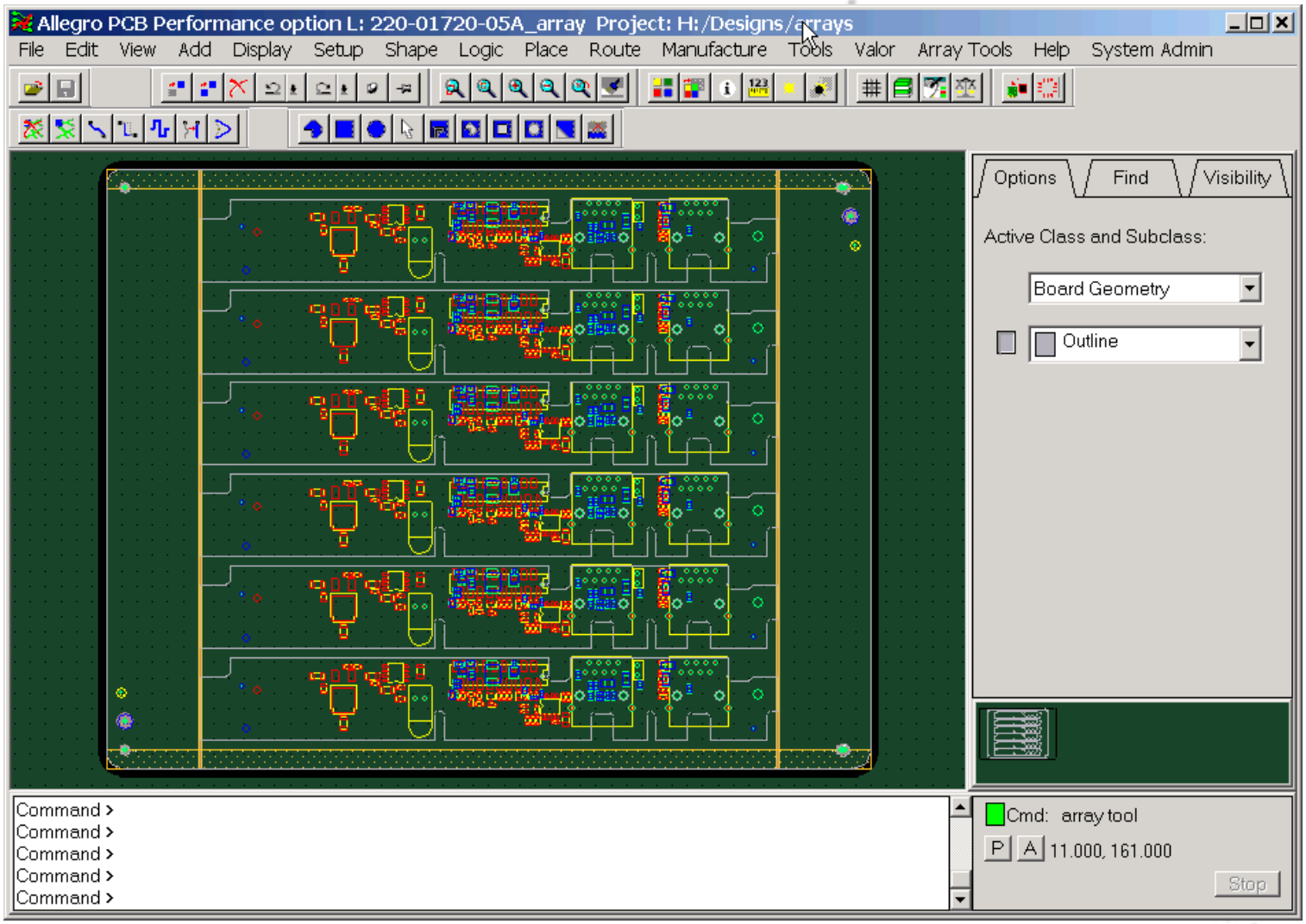
Step 2: Array Layout Optimisation

- **Preview alternatives**

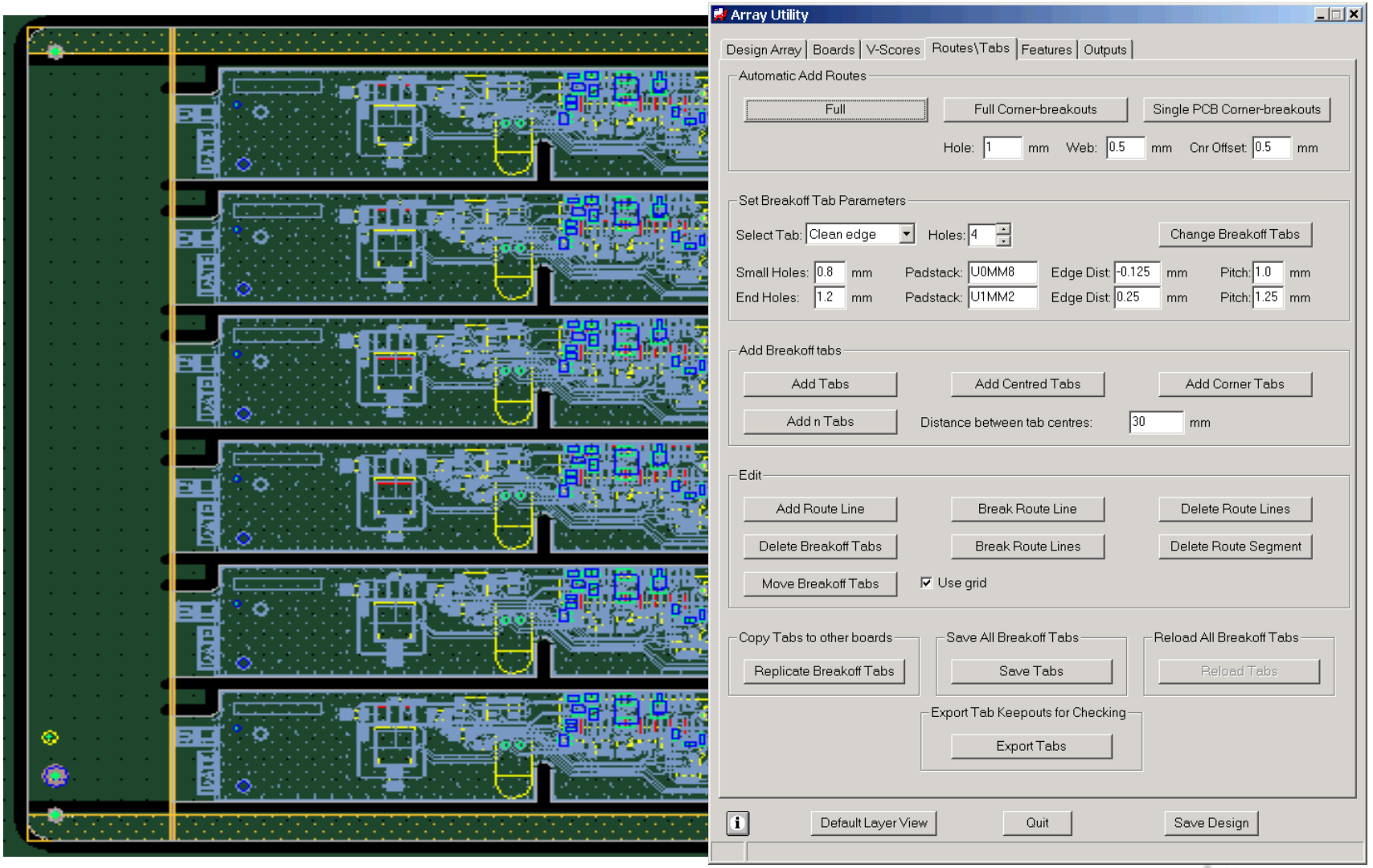




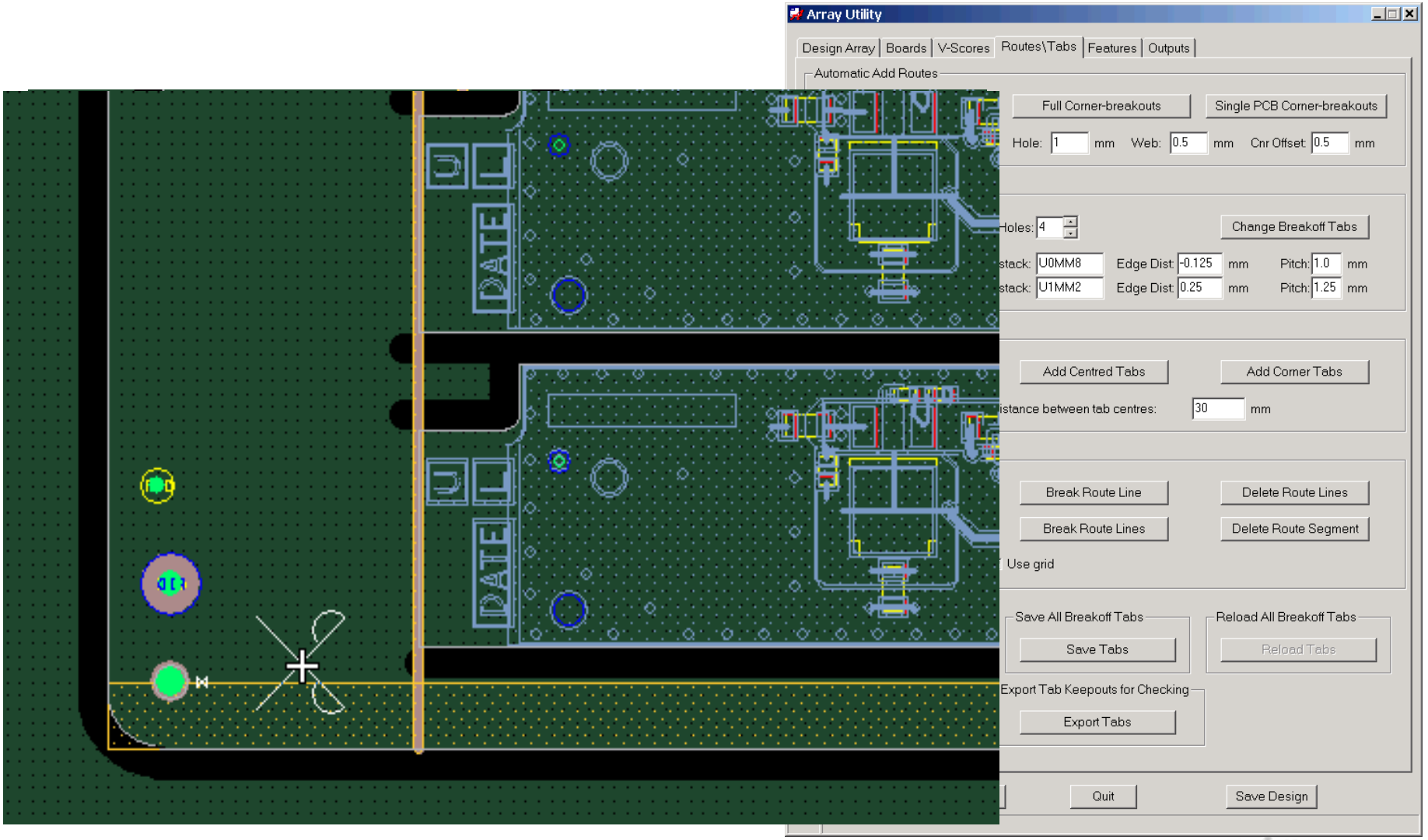
Step 3: Build Array



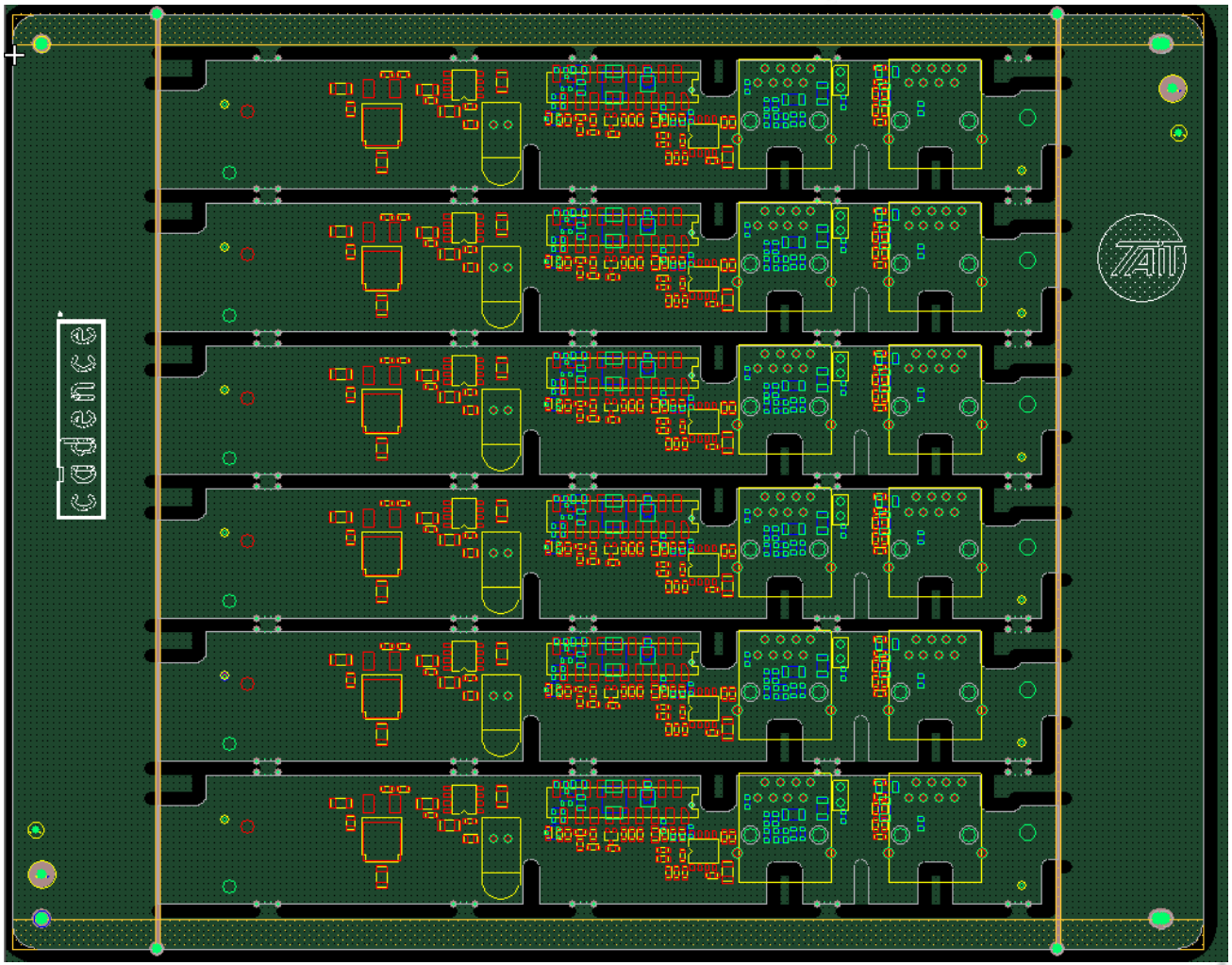
Step 3: Add Routes



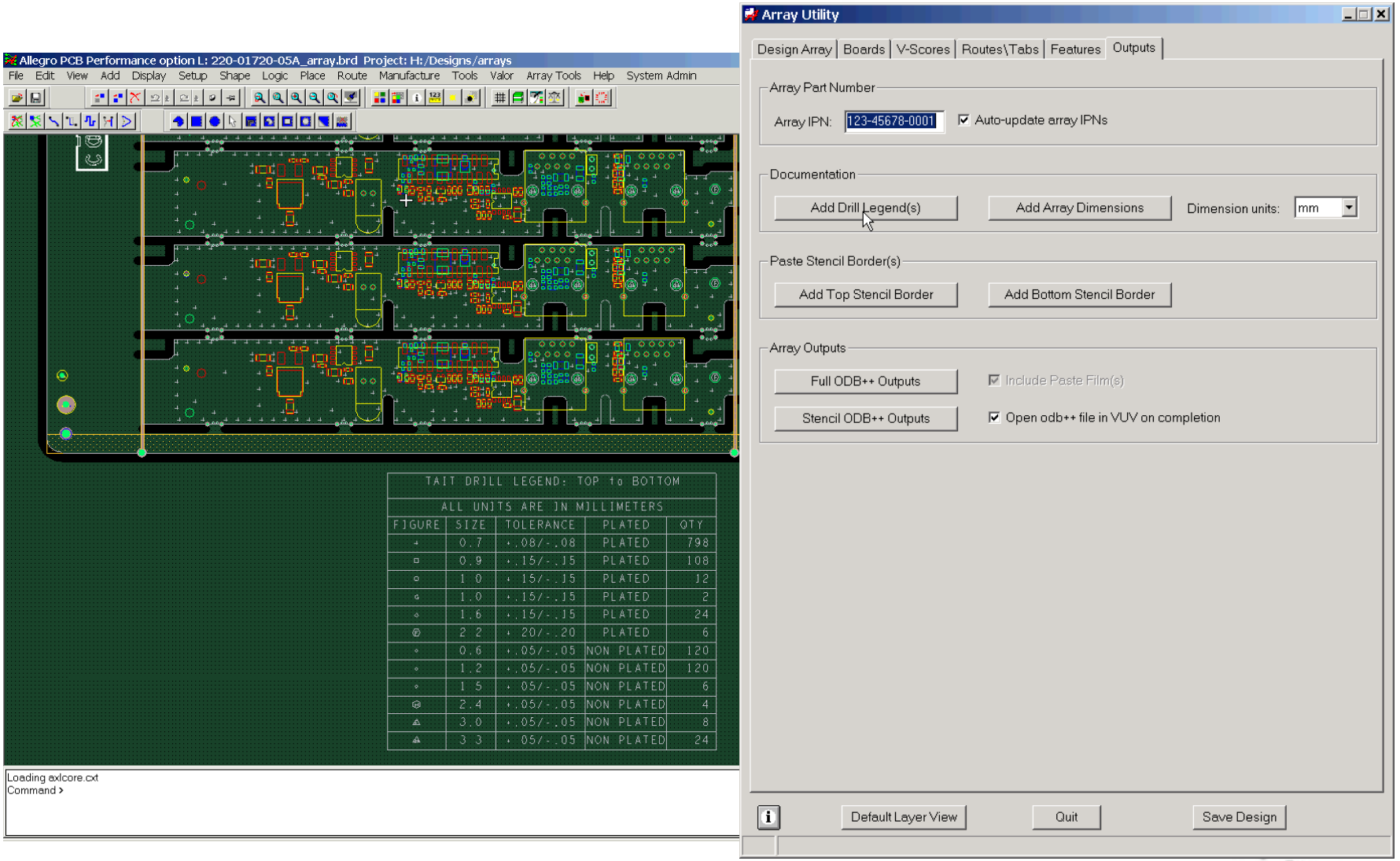
Step 3: Tidy Routes



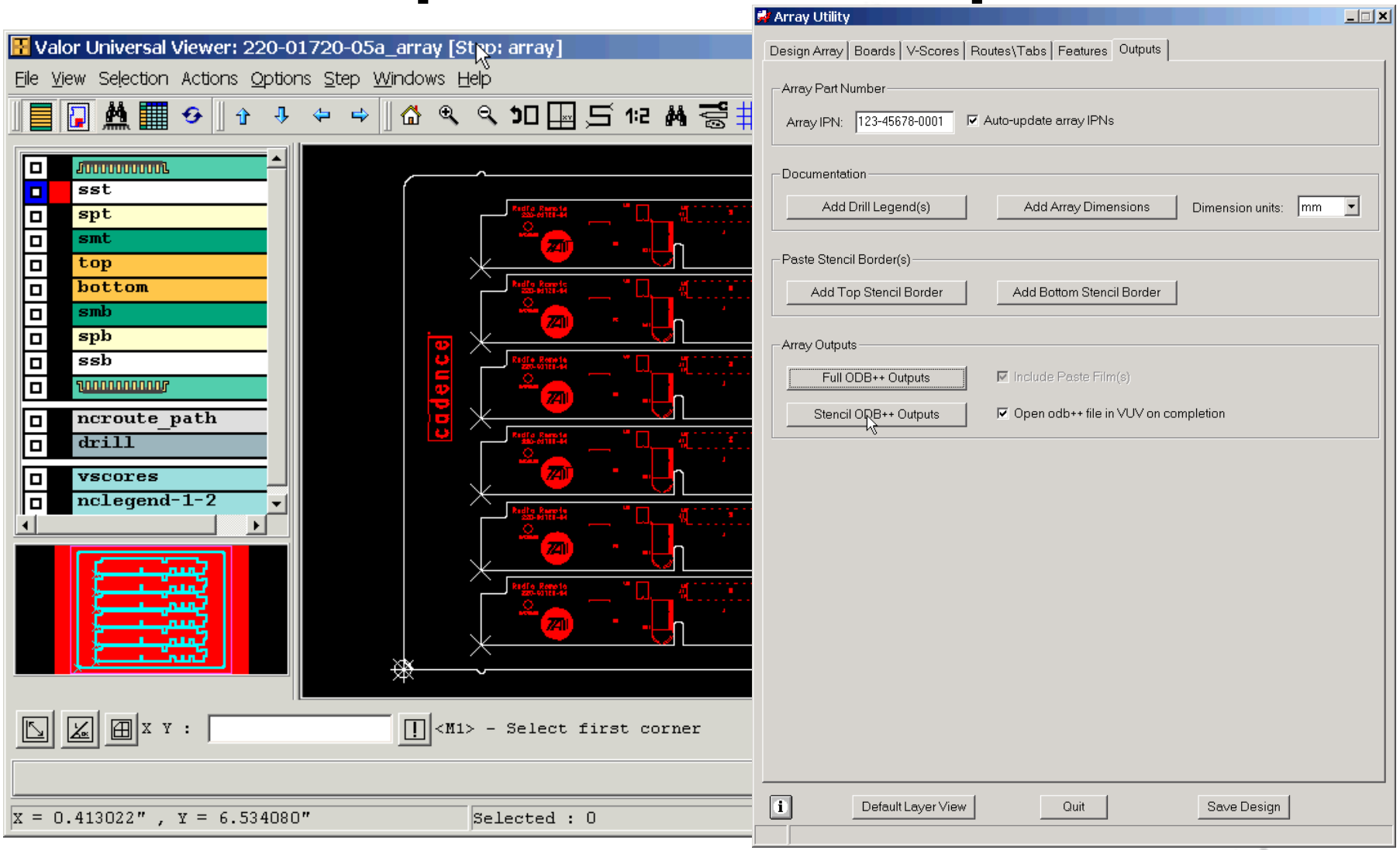
Step 4: Add Features



Step 5: Drill Legend



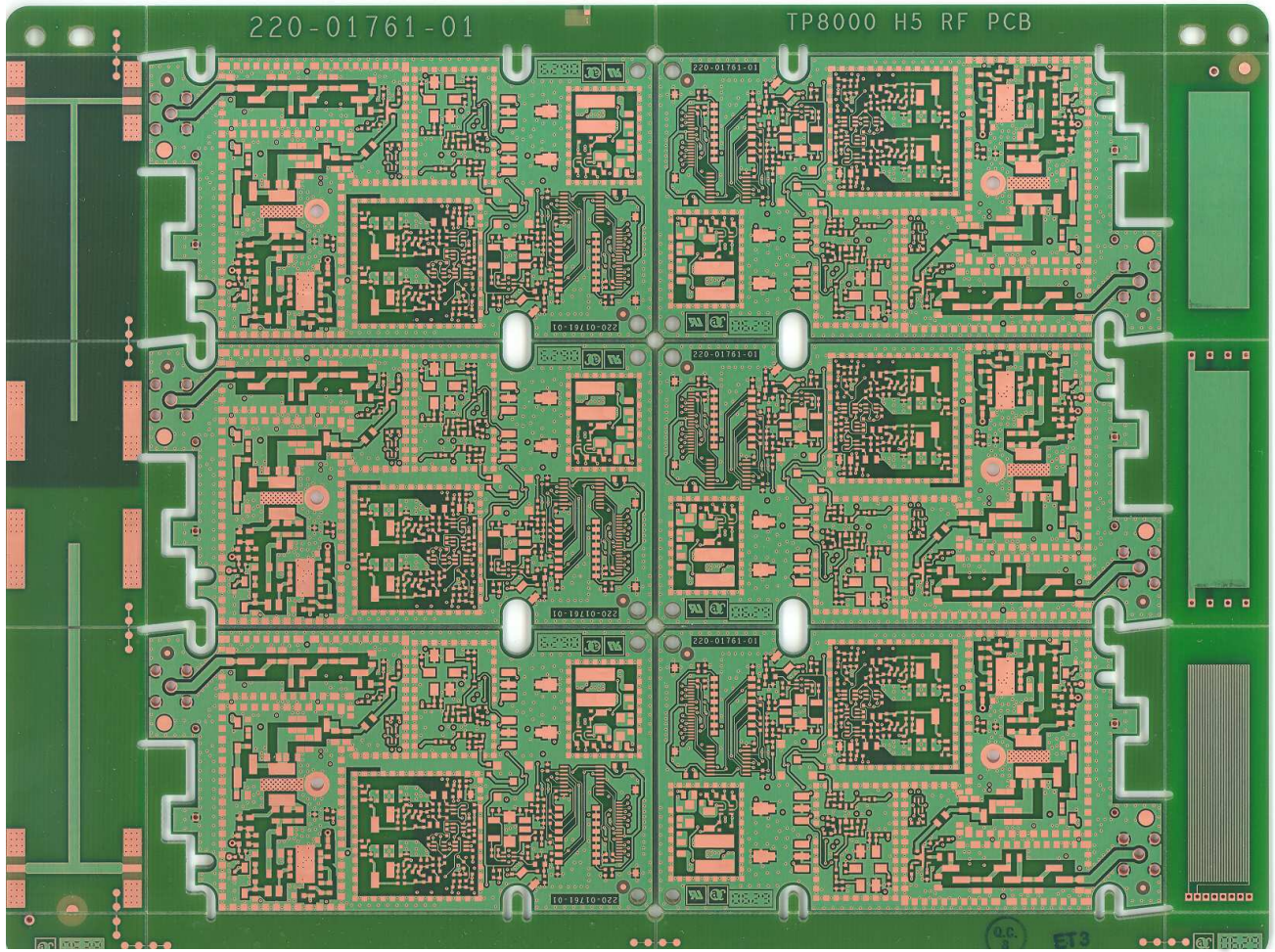
Step 6: ODB++ Outputs



Tool Summary

- **Output is ODB++**
  - Handles nested boards
  - Generally accepted format
  - Open source standard
  - Embedded in Allegro
- **Creates a Mechanical symbol (bsm) for each design used in the array.**
- **Other features added or changed using standard Allegro User Interface.**

Demonstration



Future Enhancements

- **Nested arrays**
  - Would enable several arrays to be used in a single fabrication panel. This could reduce PCB fabrication CAM set up costs.
- **Improved help and documentation**
  - Currently very little documentation exists for the flow or features.

Q & A