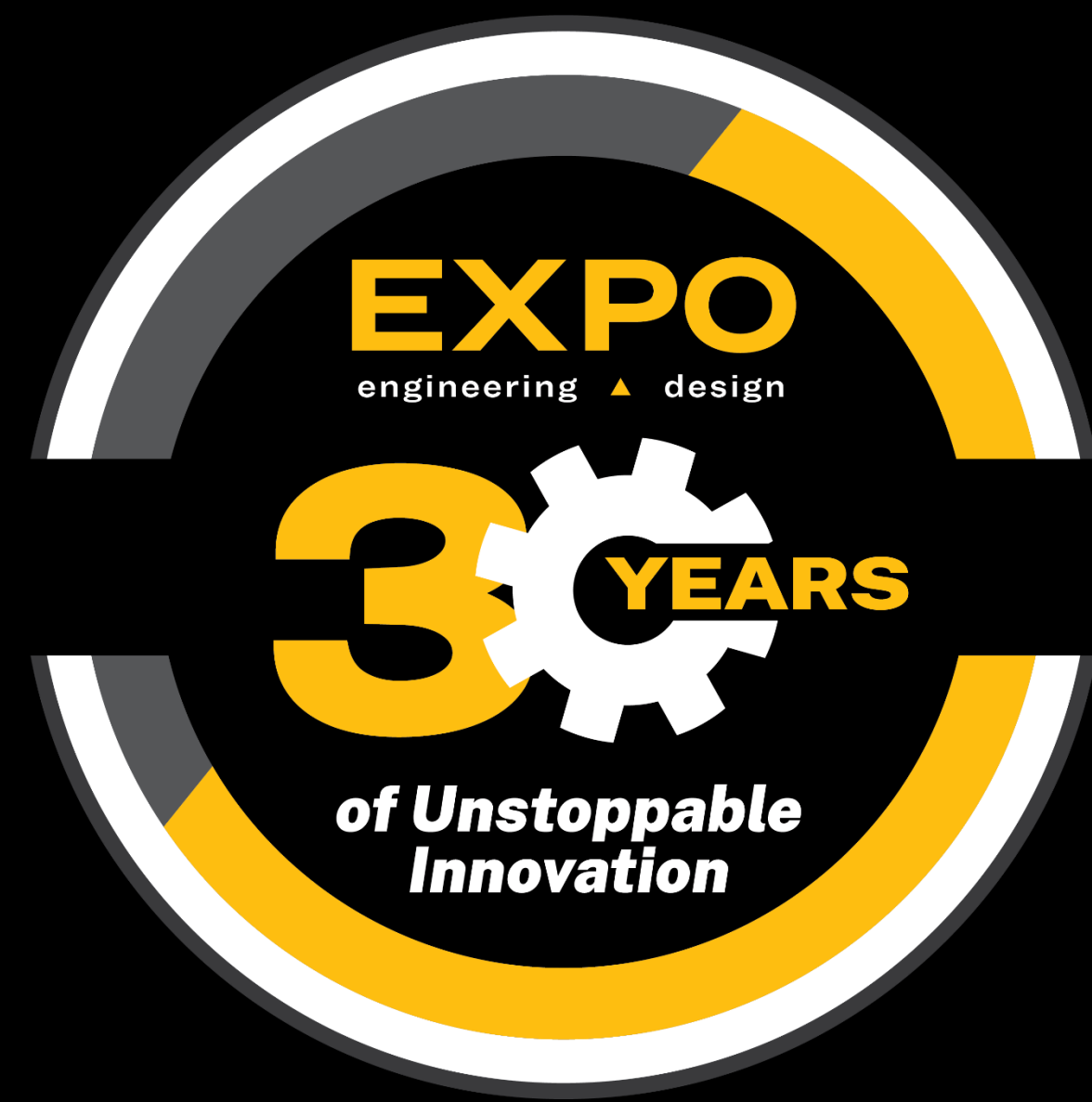




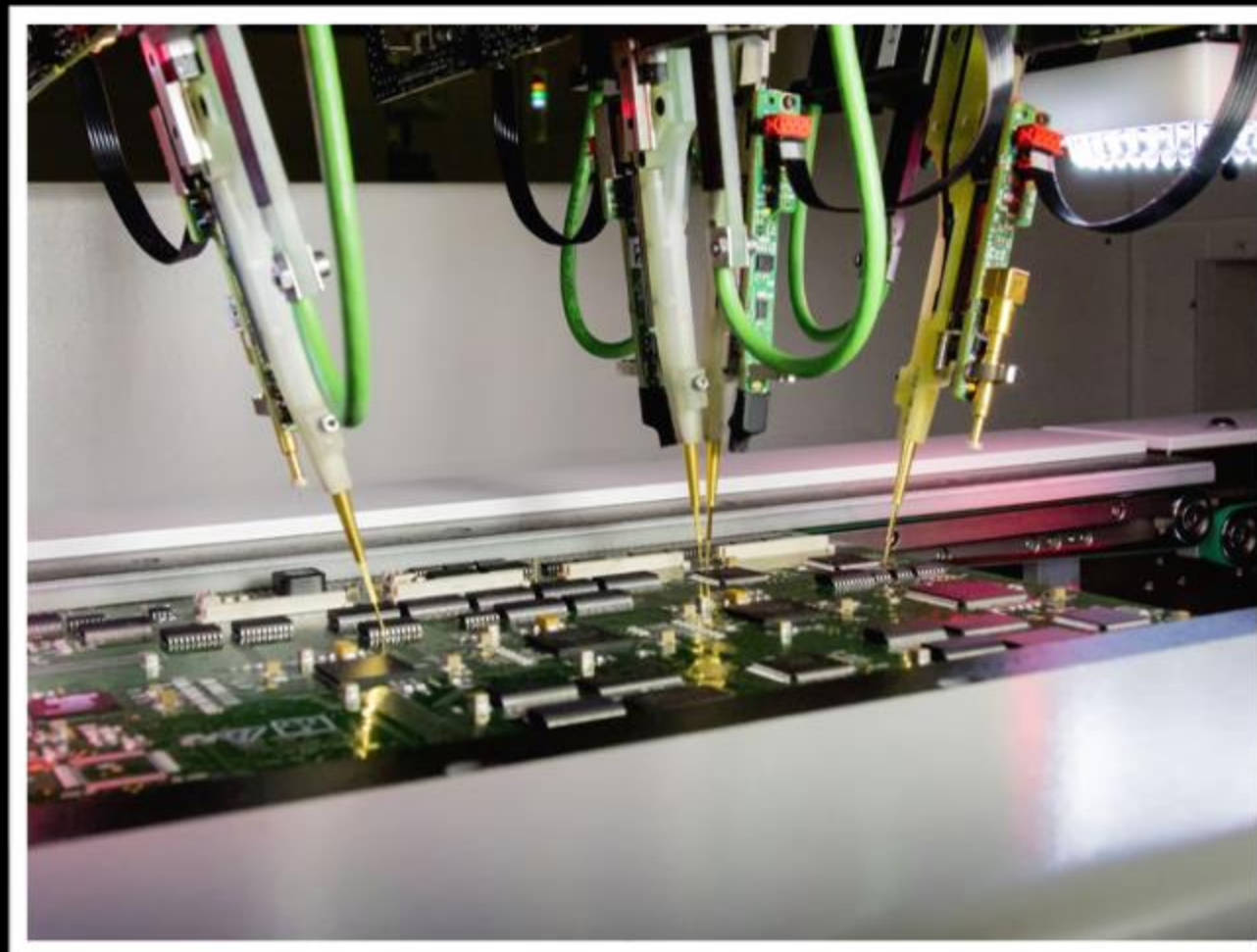
# UNIVERSAL CIRCUIT BOARD PALLET



**MICHAEL CADMUS - STRATTON JENKS - TYLER SAND - BEN WREN**

**OBJECTIVE:** Design an apparatus to transport any circuit board through the SPEA Flying Probe automatic circuit board tester.

## BACKGROUND



- The SPEA system performs automatic testing of PCBs
- A pallet is required to hold most PCBs in the tester

- Current pallets fit one board configuration
- Our pallet reduces overall cost, time to production for new boards, and storage space

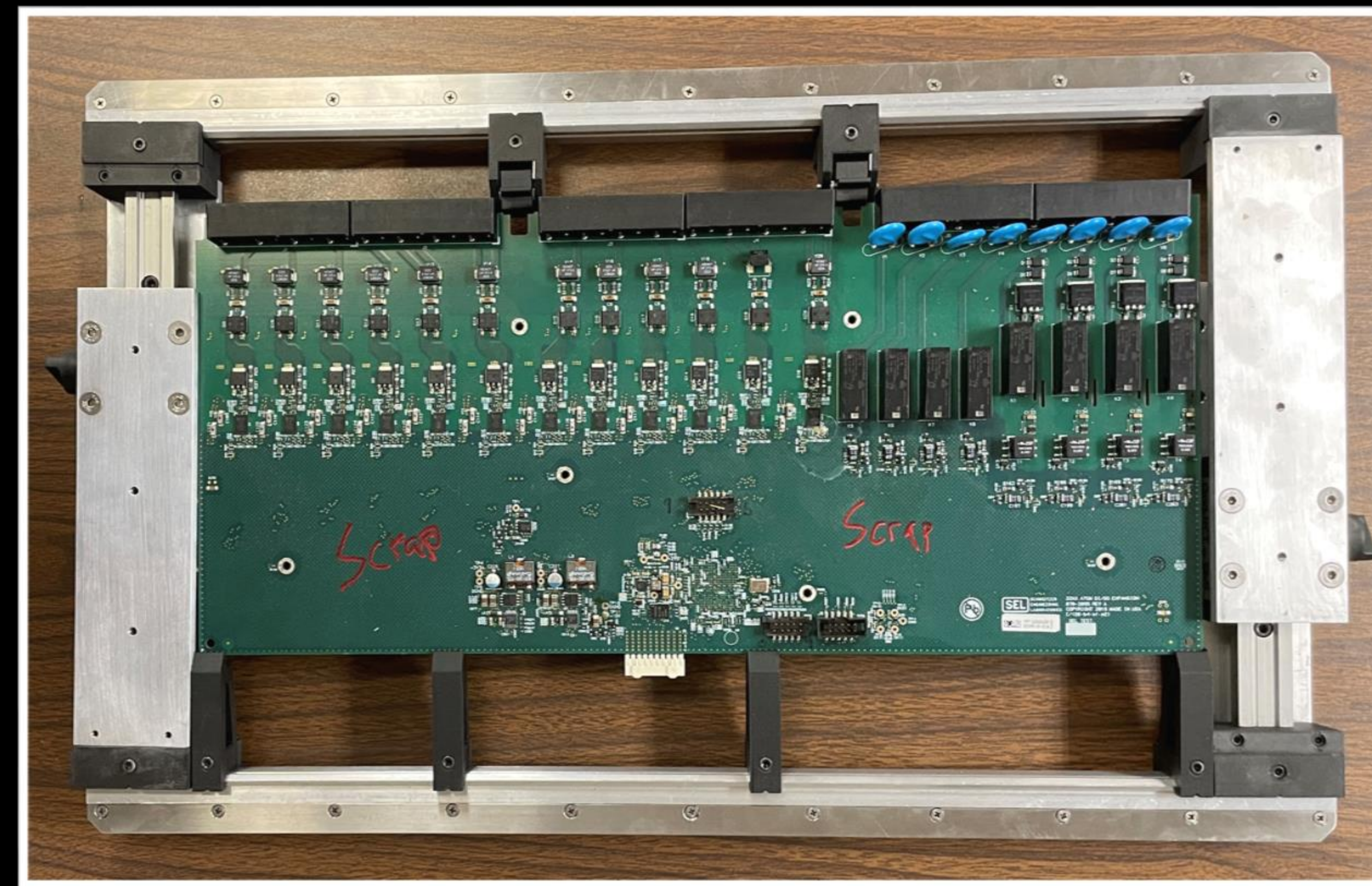
## REQUIREMENTS

Our universal circuit board pallet must:

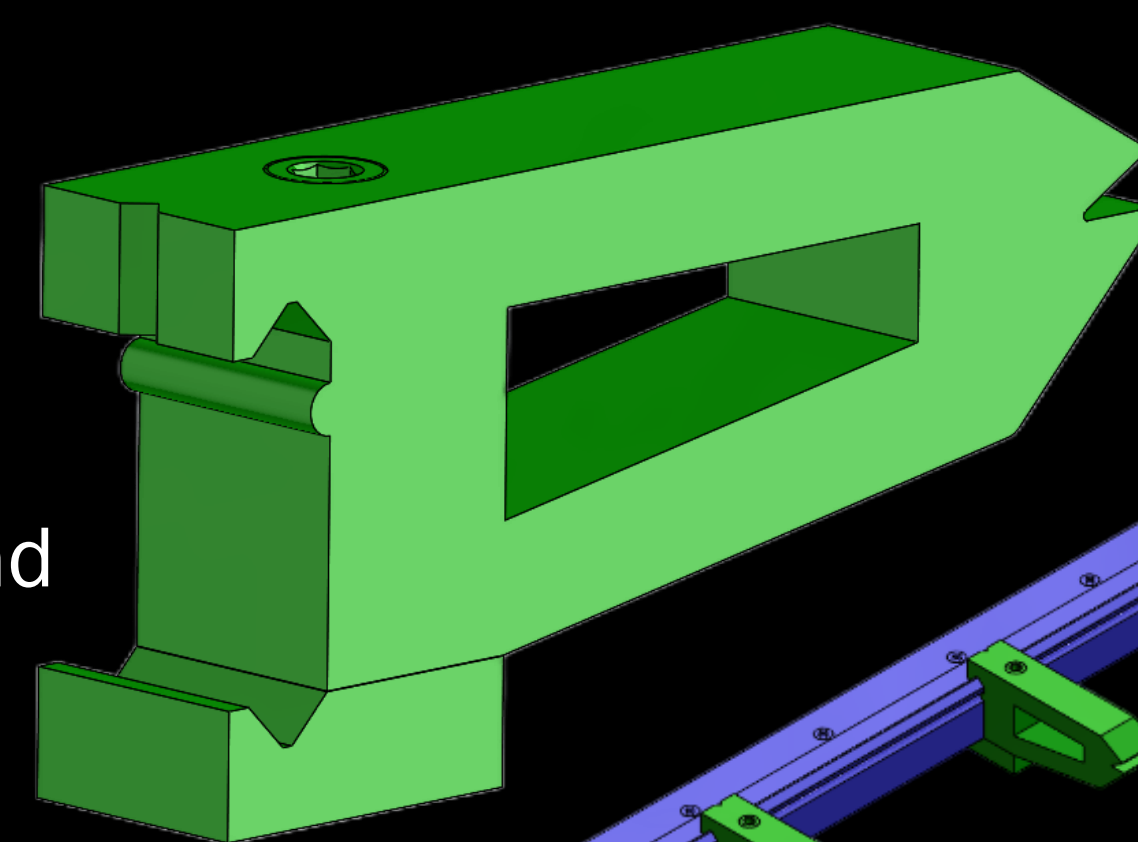
- Accommodate most board configurations and sizes, including overhanging components
- Interface with the SPEA rail system
- Provide access to board from top and bottom
- Allow for quick and repeatable board swaps

## DESIGN FEATURES

- Two pallet sizes to accommodate full range of boards
- Fixed and rotating board interfaces for easier swaps
- Notched rails to prevent improper assembly and board damage
- Removeable transport wings for easy replacement and machining

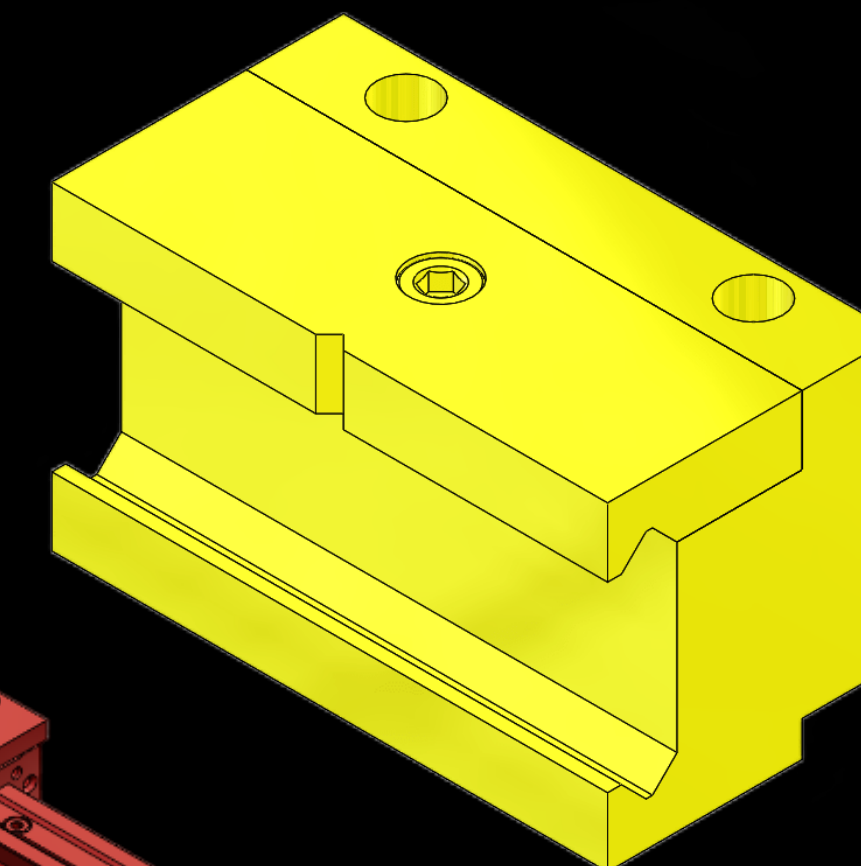


Fixed Board Interface



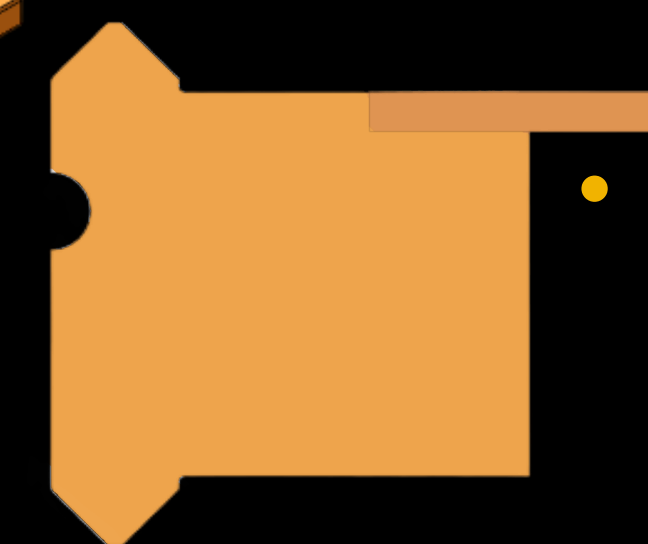
- Constrains PCB movement along rail

Quick Disconnects



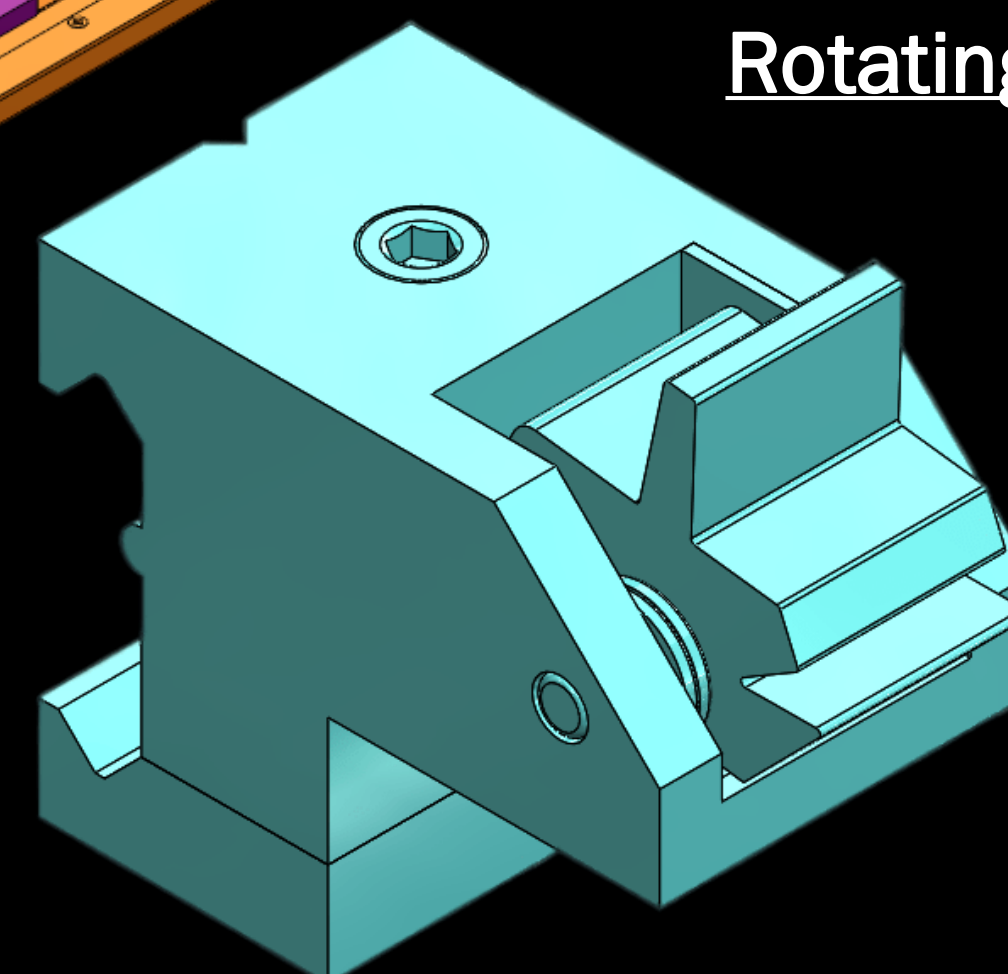
- Disconnects join transport wings and sliding links
- High and low configurations

Transport Wing and Rails:



- Rails machined from picatinny rail stock and sheet metal

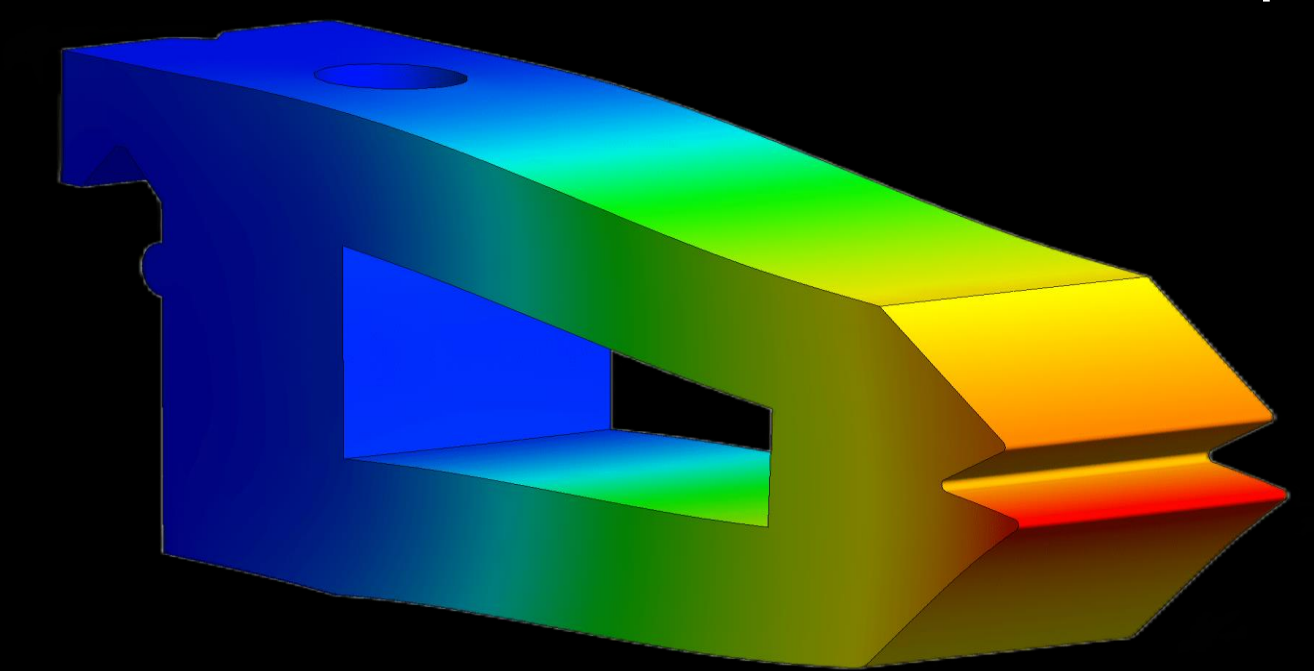
Rotating Board Interface



- Allows boards to be "snapped" in and out of pallet with no adjustments
- Decreases board installation time
- Ball detent locks mouth into up or down position

## VALIDATION

- Swap Times: Conducted time trials
- Board to Board: 10 Seconds
- Configuration Reset: 1-5 Minutes
- Vertical Deflection: Conducted deflection testing
- Less than 0.1" vertical deflection
- Stress Analysis: Solidworks FEA, Hand Calcs
- Well within allowable stresses for all parts



## RECOMMENDATIONS

- Improve indexing of the pallet
- Design low profile carriages and alter transport wings to optimize overall design height

- Accommodation for odd PCB geometries

## ACKNOWLEDGMENTS

- **Sponsors:** Christian O'Bryan, Alex Olson, Jonathan Richards, and Rob Schindler
- **Instructor:** Dr. Matthew Swenson
- **Graduate Mentor:** Kaitlin Tabaracci
- **Special Thanks:** Brian Petty – Shop Manager, Dr. Joel Perry – 3D Printing Expert