

FD2 VD Mod-1 Design Changes

24 June 2023

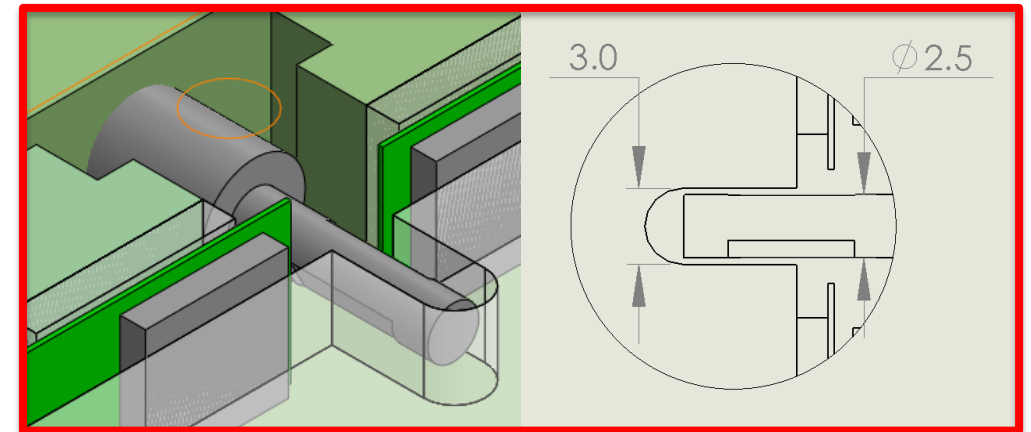
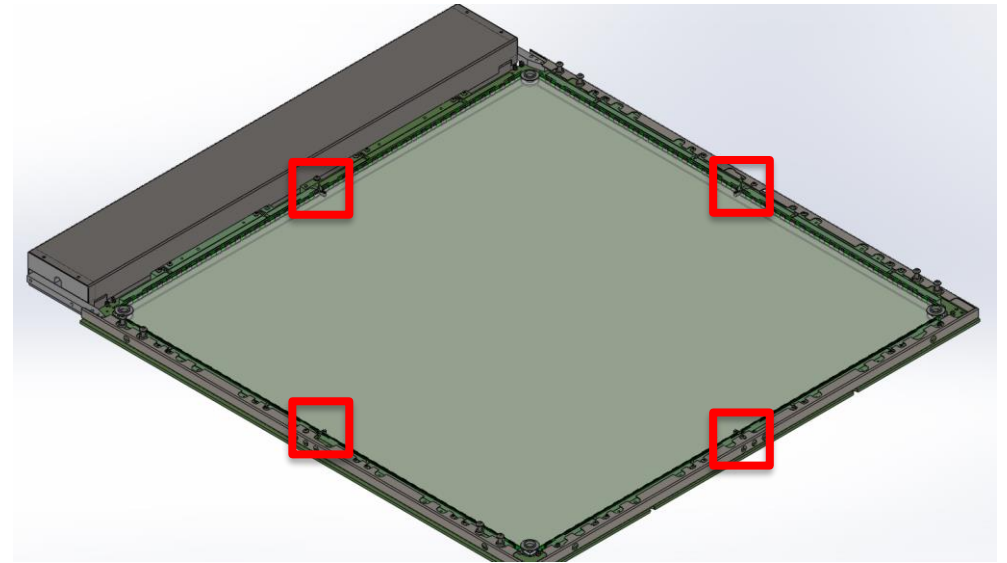
Zach Rautio

Contents

- Required Changes
 - Design for Reliability
 - Design to Assembly
- Open Questions

Design for Reliability

- Pin Dimension
 - WLS-locating pins bent by suspected shipment mishandling
 - 2.5mm pin dia. driven by pre-V5 3mm slot in WLS
- Slot must increase from 3mm->4.5mm at minimum
- Improves:
 - *Safety during shipping*
 - *Easier assembly*
 - *Looser assembly tolerances*

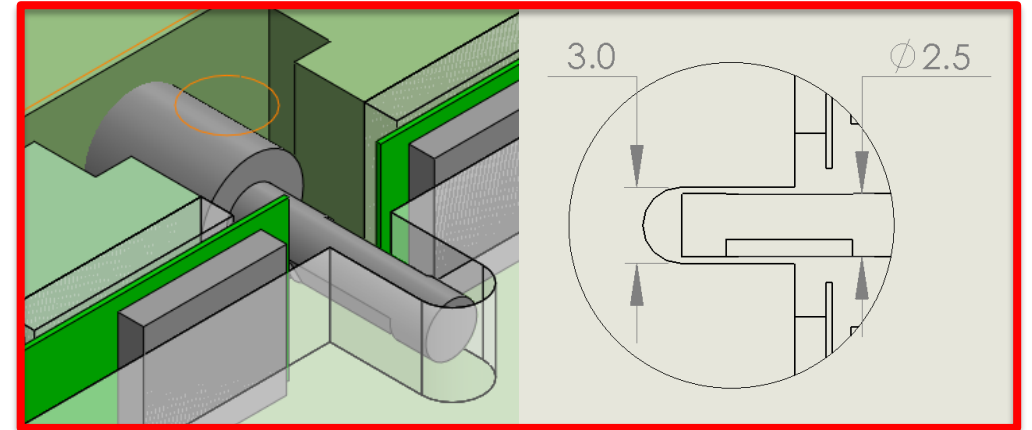


Design for Reliability

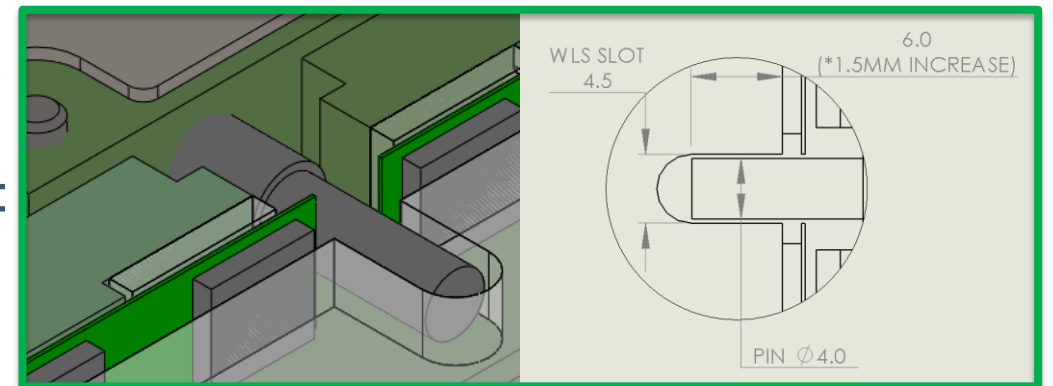
- Pin Dimension

- WLS slot width increased 1.5mm
 - (3mm -> 4.5mm)
- WLS slot depth increased 1.5mm
 - (4.5mm -> 6mm)
 - Alleviates tolerance stack-up concerns during frame assembly *and* cooldown
- Pin diameter increased 1.5mm
 - (2.5mm -> 4mm)
 - Vastly improves confidence in pin function, in terms of both WLS capture *and* structural integrity.

M0:



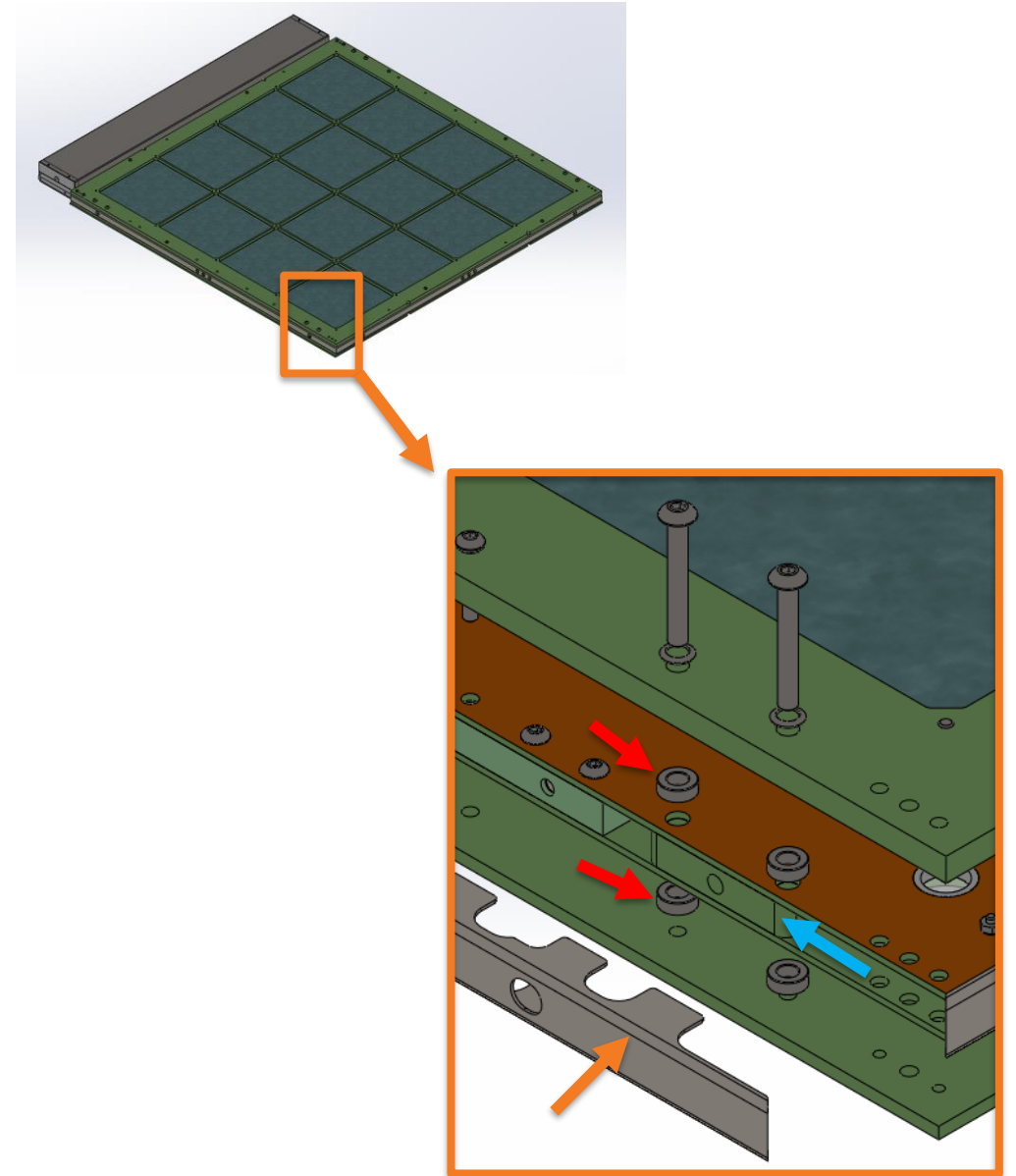
M1:



Design for Assembly

Mounting Components

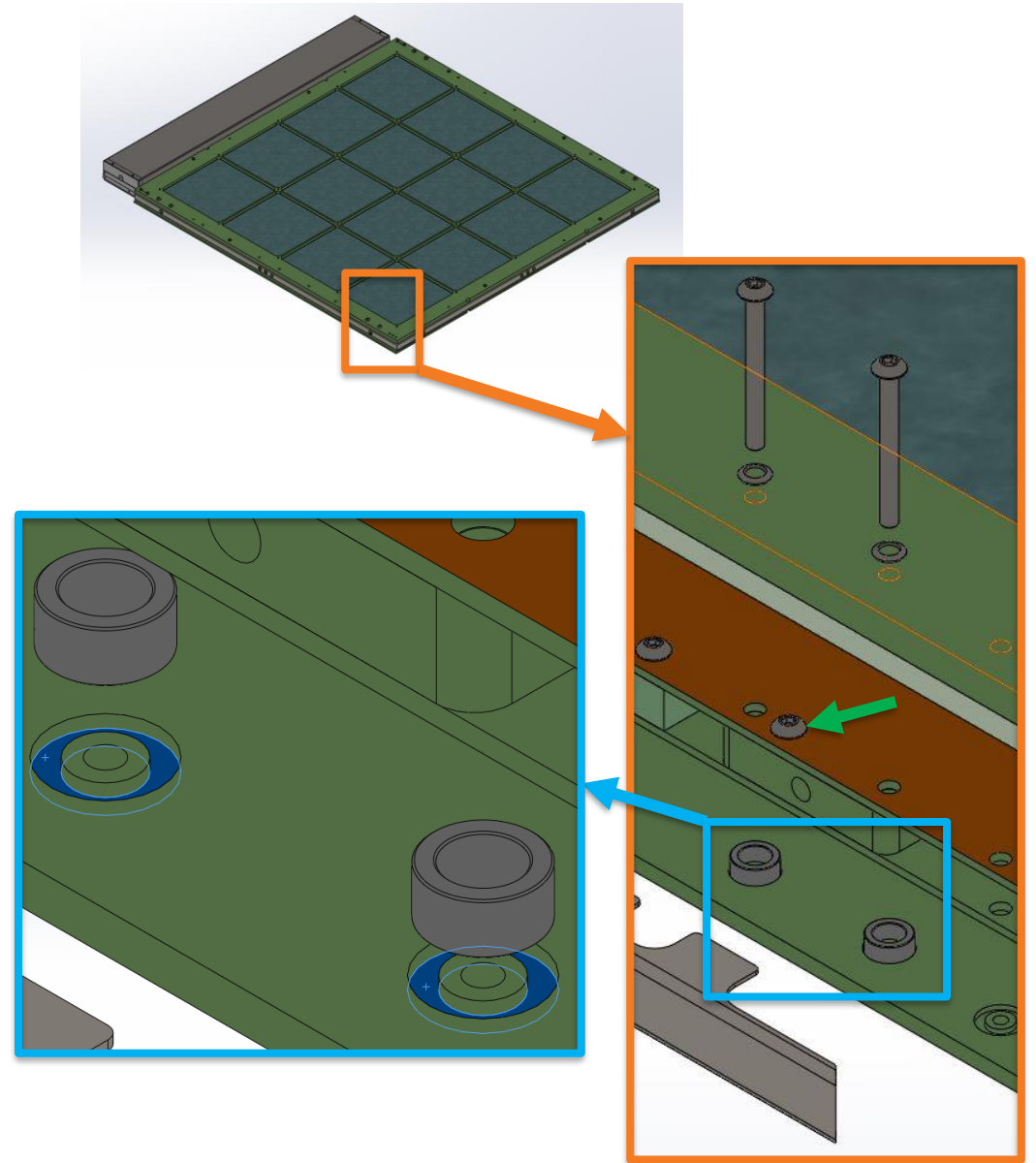
- Mod-0 Issues
 - Original design intent called for perimeter faraday c-channel & electronics enclosure installed at final step
 - Shifting design requirements for turnkey WLS housing *prior* to Frame install complicated the procedure
 - External Mount Blocks (Blue) and Dichroic Frame Spacers (Red) float until fasteners are installed.
 - When installed earlier, Faraday C-Channel Shielding (Orange) blocks placement of spacers and blocks
 - Spacers are free to slide out of alignment or onto WLS



Design for Assembly

Mounting Components

- Mod-1 Proposed Solution
 - (Green) Fasten External Mount Block to Cu-Clad Faraday Cage
 - *Non-Structural*
 - Only intended for “tacking” block prior to final assembly, will not slide out of alignment
 - Does not need to be removed later
 - (Blue) All Spacers become integral to frame
 - Thin layer of epoxy in spacer pockets
 - *Non-Structural*
 - Temporarily mates spacers to frame during assembly



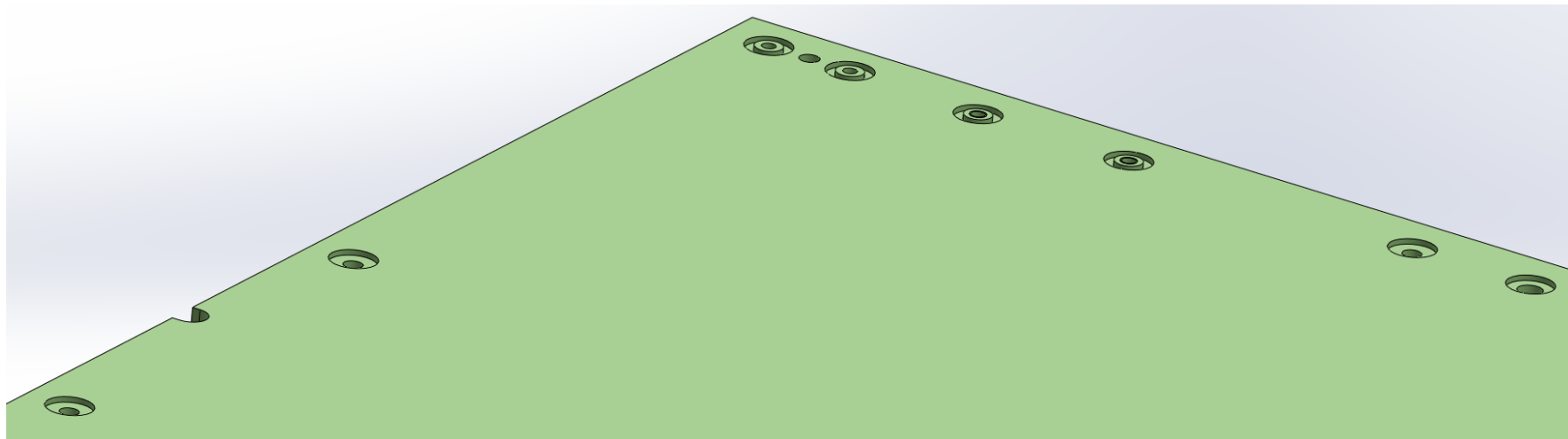
Design for Assembly

- Benefits

- 1) Vastly simplified assembly – Minimized free-floating components. Epoxy and forget.
- 2) Some additional flexibility in dichroic frame spacing
- 3) Reduced Hardware Variety
 - All fasteners become M3
 - Same spacer size throughout

- Drawbacks

- 1) Increased manufacturing time
 - Added manufacturing step in membrane back plates
 - Small increase for all others (we're already pocketing the others – design should capitalize on this)
- 2) Additional QC item



Open Questions

- Were any mechanical issues found during cold testing?
- Flexboard Resistor Pattern
 - Mod-0 (Horizontal, R0)
 - Mod-1 (Vertical, R1 – pictured top right)
- Mod-0.5 (*Early Notes*)
 - Items likely needing retrofit:
 - Faraday Cage & Grounding Scheme
 - *Is mirrored functionality required?*
 - WLS Constraints
 - External Mounting
 - *Same test stand used previously?*
 - *Et Cetera*

