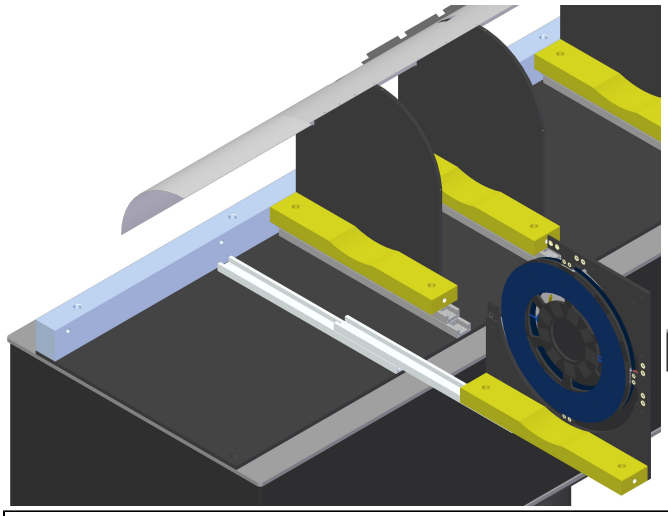
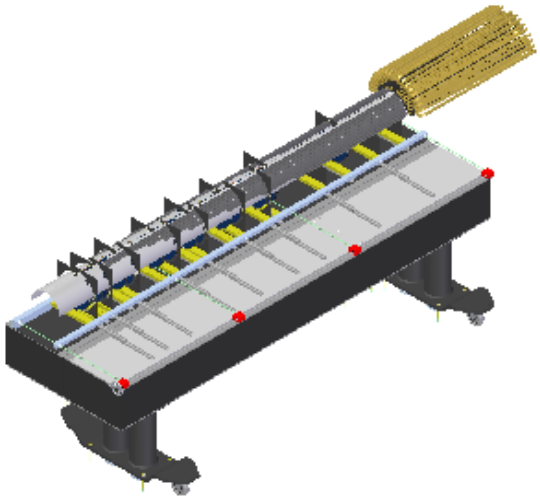
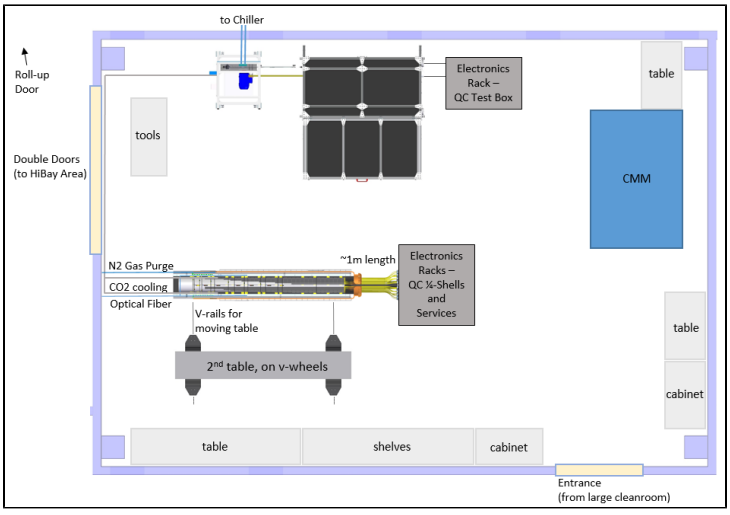
19-0/1 Integration Tooling

Integration sequence:

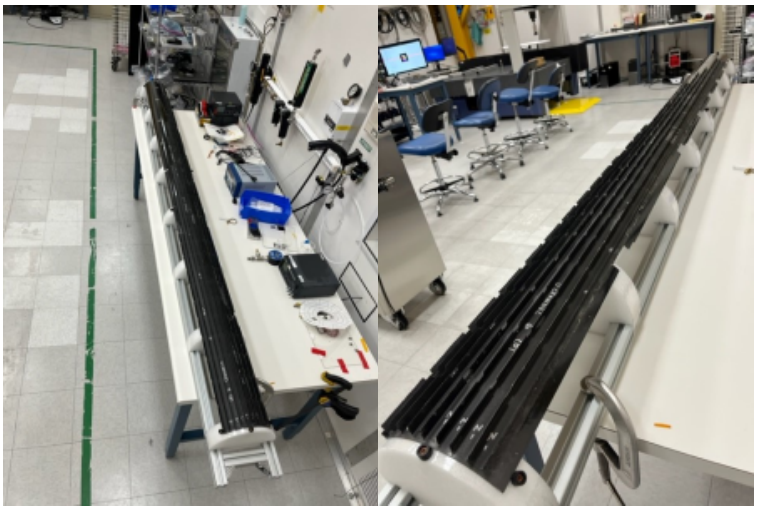
- Loaded Modules on Rings
  - Welding, QC testing
- Load Services into ¼-shell
  - Transfer ¼-shell to integration tooling
- Load Rings into ¼-shell
  - Transfer Rings to integration tooling
  - Integrate Rings into ¼-shell
  - Welding, QC testing
- Integrate two ¼-shells
  - QC testing
- Package, ship







19-0 1/4-shells in B33 cleanroom:



Past presentation: Integration Tooling and Plan at SLAC 8 Nov 2021.pptx

Next steps:

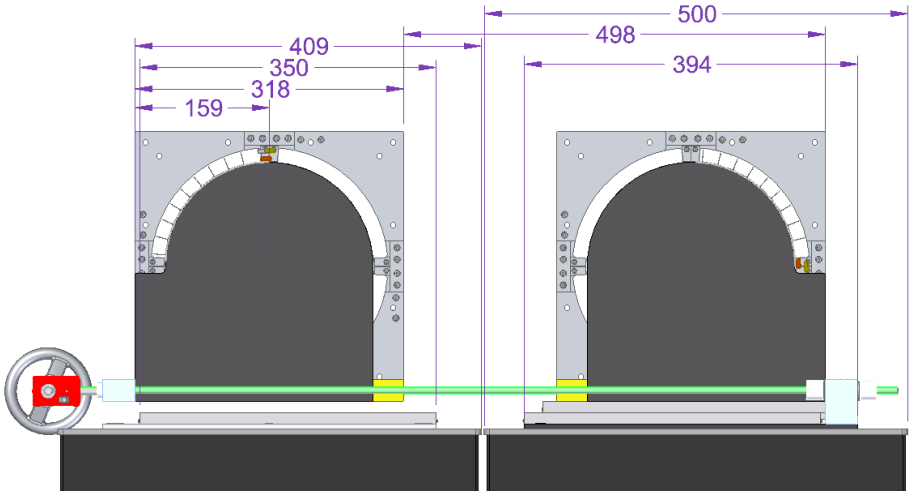
- Prepare for 19-0 (Drafting - setup with dummy rings and linear slide)
- Finalize design/drawings of tables

Linear Rail

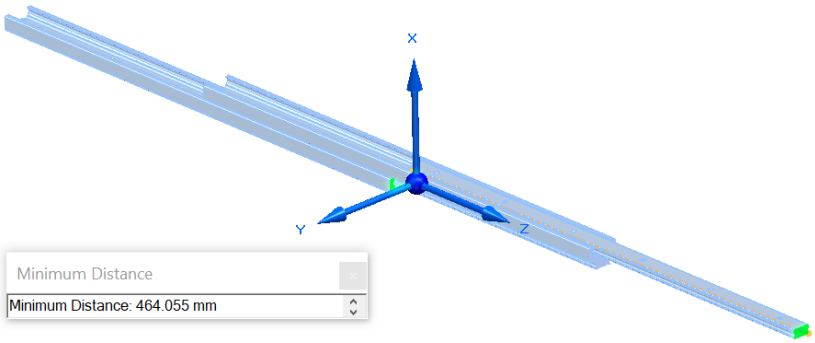
Selection of a linear rail and bearing to test for 19-0/1.

Requirements (preliminary):

- Cleanroom compatible
- Load: operator handling loads
    - weight of loaded Ring and HF (~1kg, not in SE)
    - operator load - handling/sliding linear rail
        - installing HF onto rail fixture while extended - robust to operator error
- Range: ~0.4m (retracted) to ~0.9m (extended)
    - extend by at least 0.5m (to make ring engage far side 1/4-shell)
    - retracted length ~0.4m (to not overhang edge of table)
- Precision:
    - Line up threaded holes in Ring with thru holes in 1/4-shell
        - 2mm pins, 2.4mm clearance holes ~0.4mm dia. clearance shared between assembly and manufacturing tolerances
        - 19-0/1 prototype: linear rail, HF bolted on. no other adjustment. unbolt/rebolt to make small adjustments via oversized holes
            - Bolt together, slide in rail, check misalignment, slide out rail, adjust if required
            - Bolt together, install taper pins, slide in rail, install fasteners
- Usability:
    - include handle
    - include lock in "extended" position
    - keep clear of fragile parts - work with covers etc.
- Travel needed:
    - ~500mm to bring one side into contact with other side
        - preserving space on table for welding/covers/etc on both sides of HF
    - ~160mm to move one HF beyond edge of 1/4-shell



- Prototype 19-0/1 concept (following what was shown previously): ~500mm travel, ~400mm length
  - 2x McMaster # 8379K6 , stacked



- Alternative: 1x ~250mm travel, ~400mm length rail per ring, to move both 1/4-shells and meet in the middle
  - not preferred: less assembly flexibility, less clearance when connecting handling frame due to less travel
- Alternative: 1x ~450mm travel, move rails to edge of table so single rail can reach far side 1/4-shell
  - not sure about rigidity cantilevered from bearing at one end, or about table space to enclose.

Candidate vendor parts:

- 8020 Inc. # 6516
  - slide on 1.5" t-slot rail. add #6800 locking handle. not preferred due to sliding friction and height.

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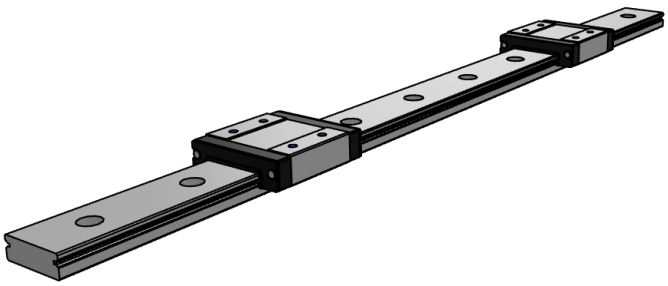
- Misumi # SSE2BWLZ14G-400
  - linear rail w/ bearings, stainless steel, cleanroom grease.



    - locking mechanism?
        - Misumi SECWK14 compatible with above, but not stainless

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        - also end stop bolts
        - Grease not preferred (cleanliness / accidental spread)

- Igus Drylin NT

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    - plastic slides
    - Sent request to Igus contact
    - Looking for:
        - ~500mm linear motion
        - ~400mm collapsed length
        - ~10lb load capacity
        - Low duty cycle (moved occasionally)
        - End stops at both ends of travel
        - For clean assembly room (ISO7) use
        - Qty ~12 of these slides