



TPC Assembly Equipment & Access

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Installation Issues

- Scaffolding and Man-lifts
- Equipment
 - What we are bringing
 - What we need from CERN
- Unresolved Installation Issues
 - Floor in Cryostat
 - CPA Trolley and load transfer
 - Load Transfer on APA
 - Load Transfer of Bridge Beam to Runway
 - Cable tray mounting to APA
 - Scaffolding Design
 - Tripod/hoist for lifting on top
 - Man hole access Bosun's Chair?

Genie IWP-25S - BUT!

Genie IWP-25S



Very smooth operating

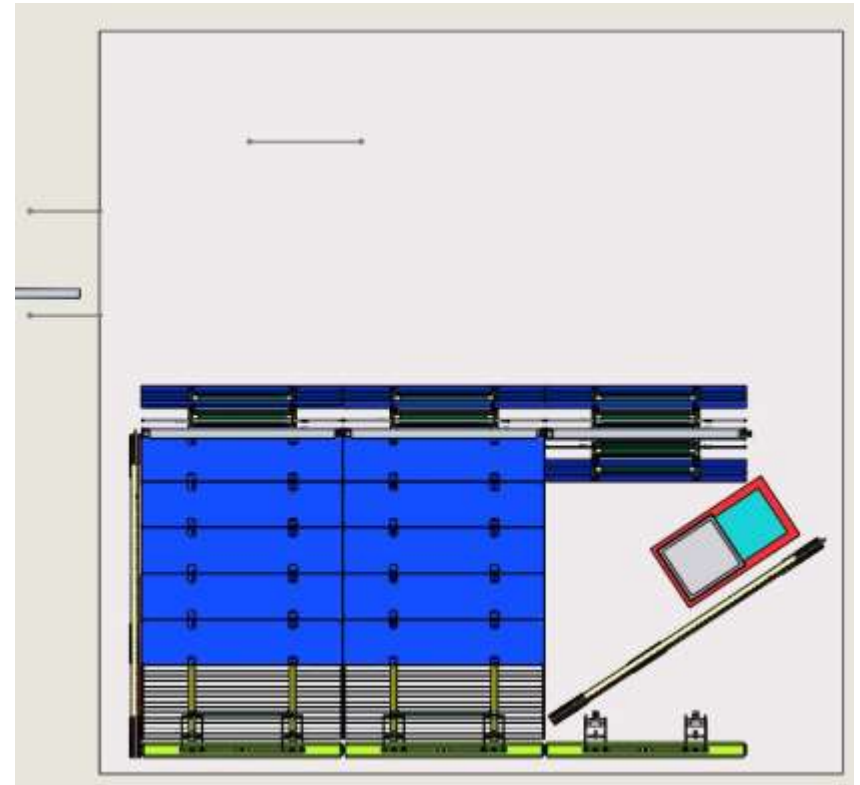
Genie IWP-25S – It has Issues

- It worked OK on a hard concrete surface but imperfections in the floor would require you to reset several times
- It only gives you access to a small area, many of the tasks like cabling become difficult because you can not reach
- To move even a few inches you need lower, get out reposition and go back up
- The single lift with outriggers is not usable in our work areas
- There is no way to deploy the north drift FC's and get the Genie out the TCO-It is impossible to reach the last FC or deploy the End Wall
- **The entrance is on the side, we need the gate in the back.**
- **We would want to plywood over false floor panel sections to help stabilize the man-lift**



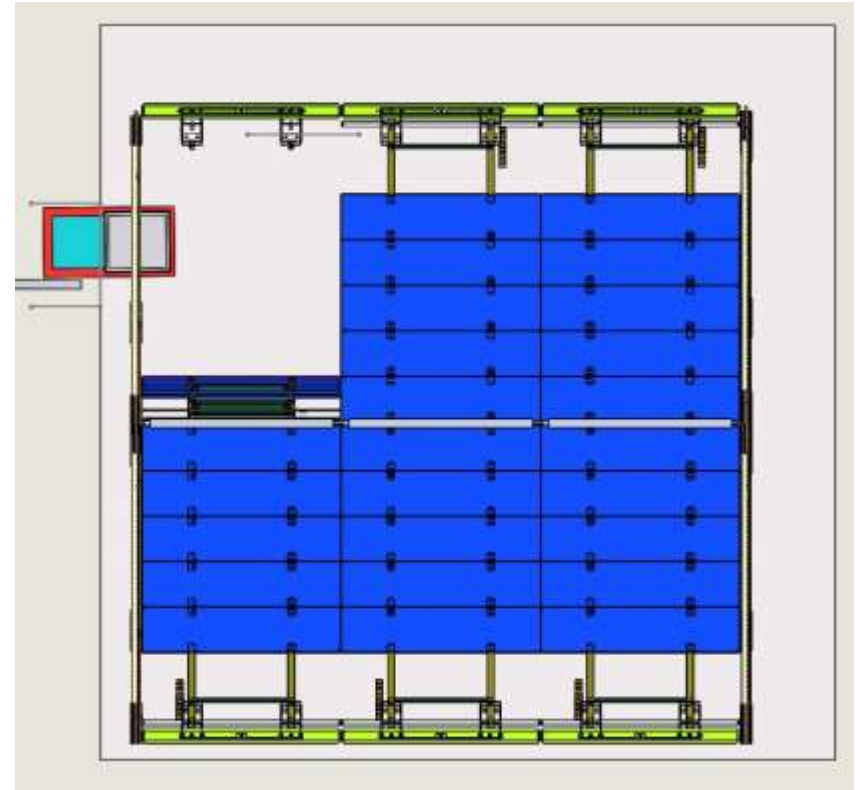
Could you deploy FC with Lift?

- Clearly the man-lift can easily be used to install the DSS and the APA cabling if stable
- Field cages work but we would tie up Bridge Beam B with the downstream end wall. This beam is what we are using to raise and lower the field cages.
- We were able to get the last end wall to latch in place



Exit out the TCO

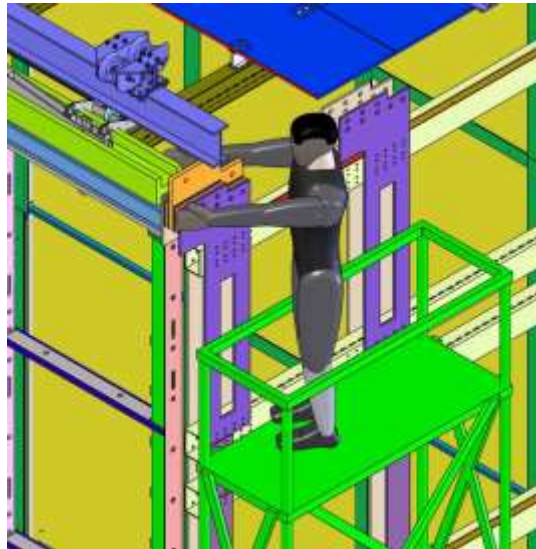
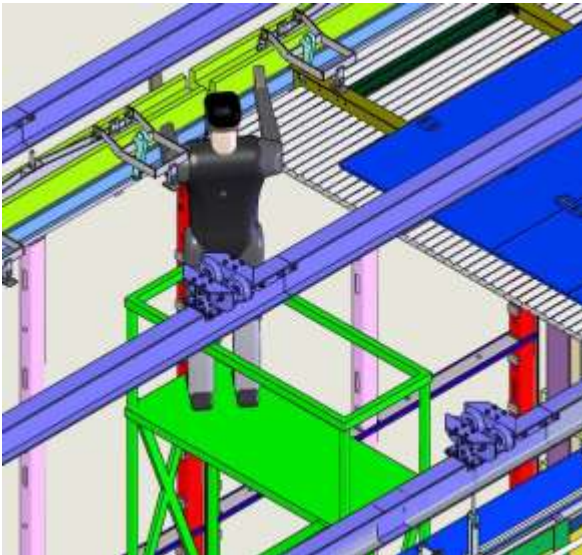
- It appears you can get most of the way there BUT!
- There is no place to put the end wall. The beam plug will not allow you to slide it south
- Even if you could get the end wall in place how do you reach the end wall hangers and make the connection from the field cages to the APA and connect the latches.



Back to the Scaffolding-Totem 2

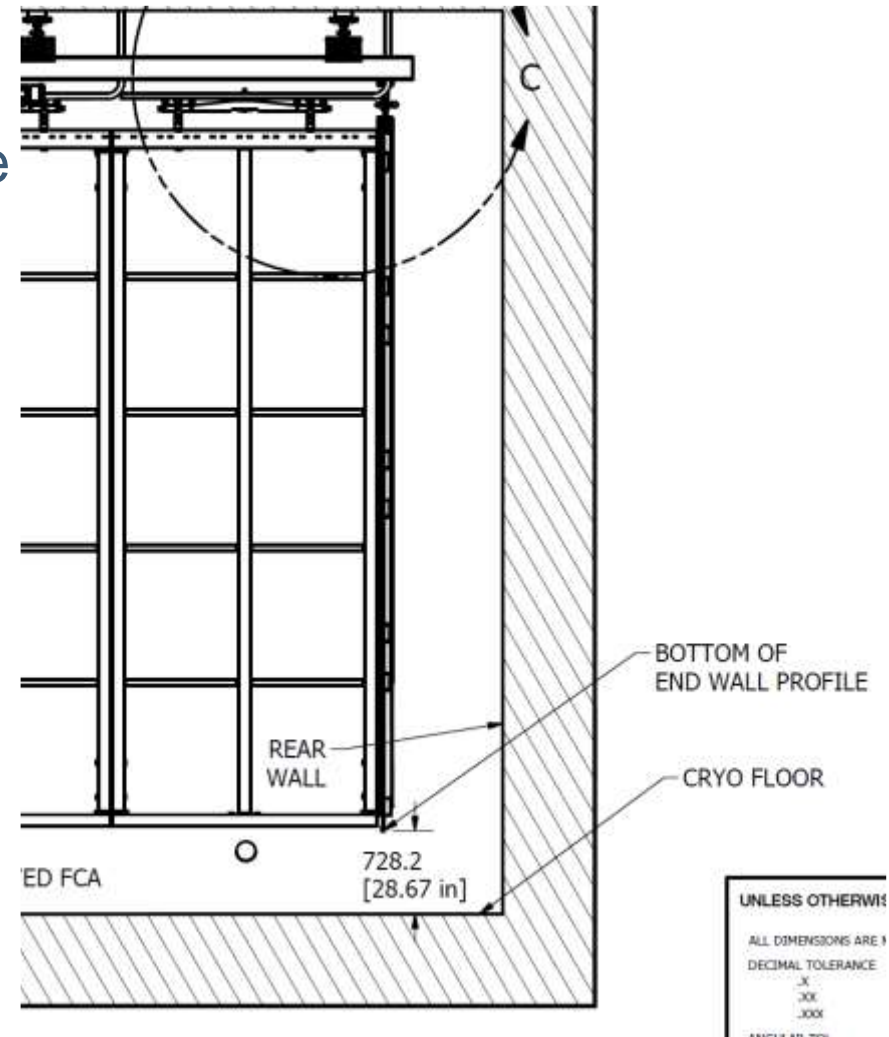
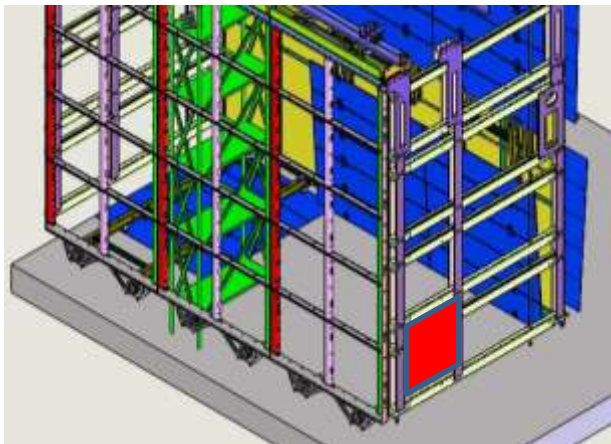
- This brings us back to using a scaffold. The Totem 2 line is light. (~450lbs) You could have the base on DU pad skids and possible slide instead of taking down each time-**Could install safety stop that makes sure it can not physically hit APA or CPC on the floor**
- We would have to use it without outriggers and tie to the runway beams
- This brings us back to the original installation sequence

Critical that we get CERN approval to use scaffolding that must be tied off at the top to Runway Beam



Access now is under Endwall

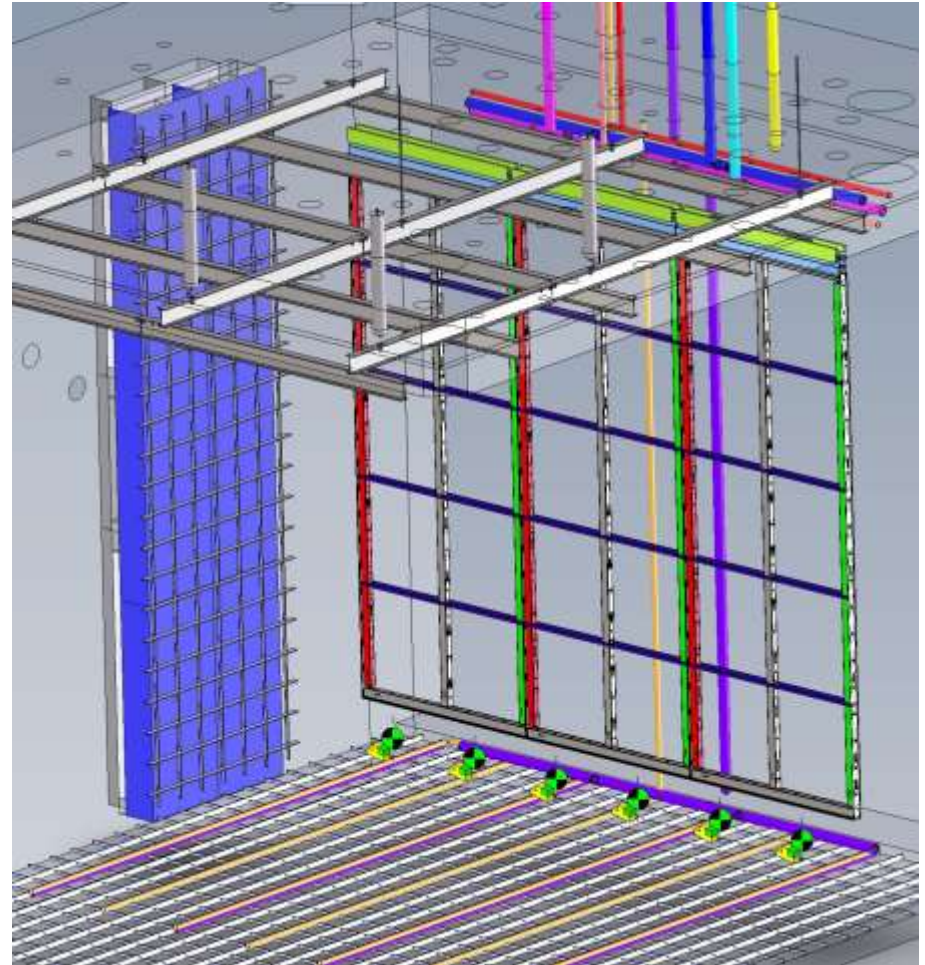
- Our original assembly sequence had us entering the South and North Drift via an opening in the End Wall. This makes the end wall design difficult.
- We have to crawl under the end wall. There is ~16" of clearance after the false floor is installed



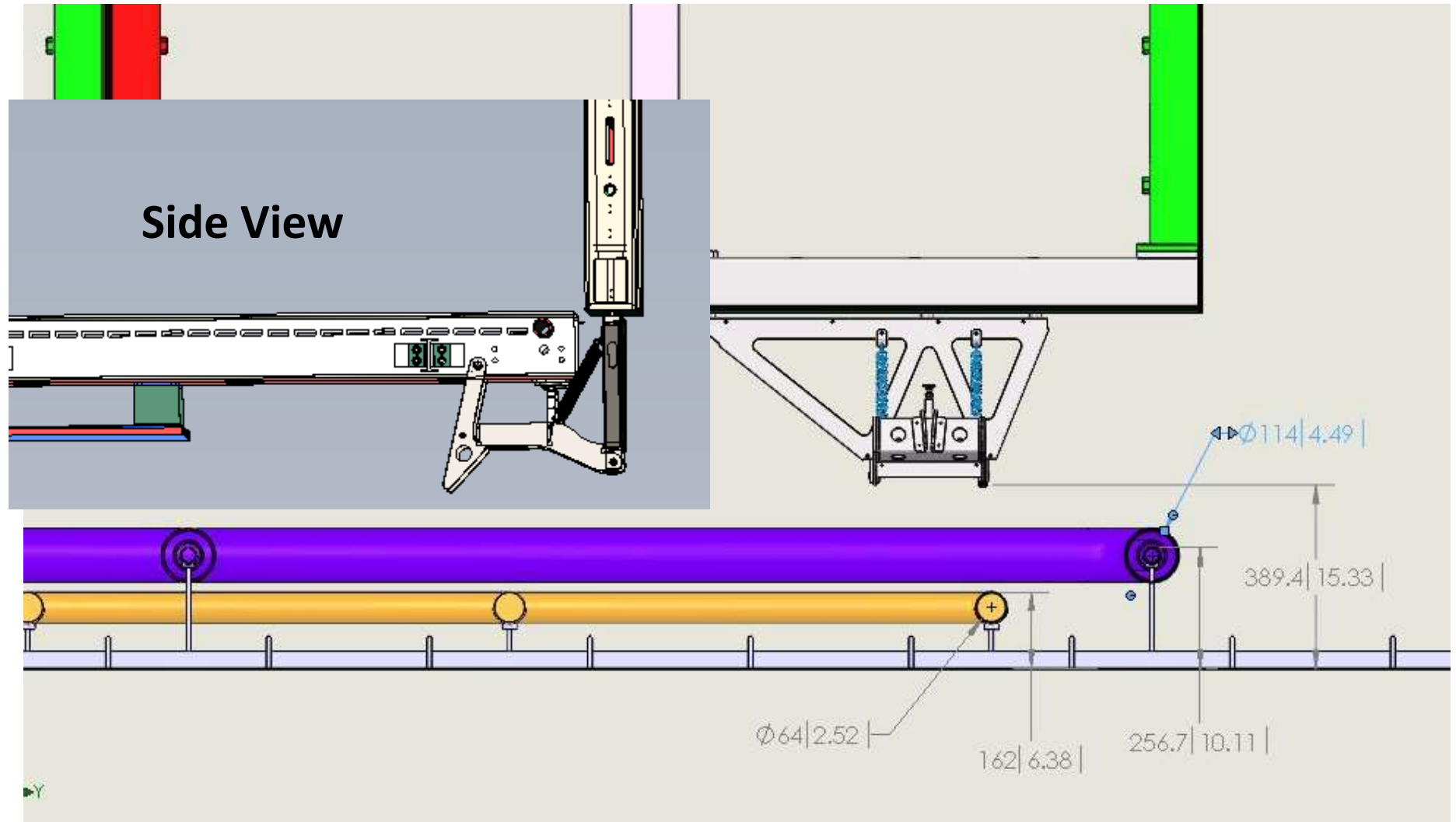
Can floor fit under the End Wall?

- Where is very limited access area under the bottom field cage.
- Since we have no false floor yet it is not clear the finished elevation
- **Clearly the floor needs to be removed and area cleaned before a FC section is deployed.**
- The North Drift all the floor panels will have to be removed out the Man-hole
- Floor sections must fit under the End Wall

JUST in case we have increase the length of the B & D bridge beams to allow us to move the End Walls- but time consuming

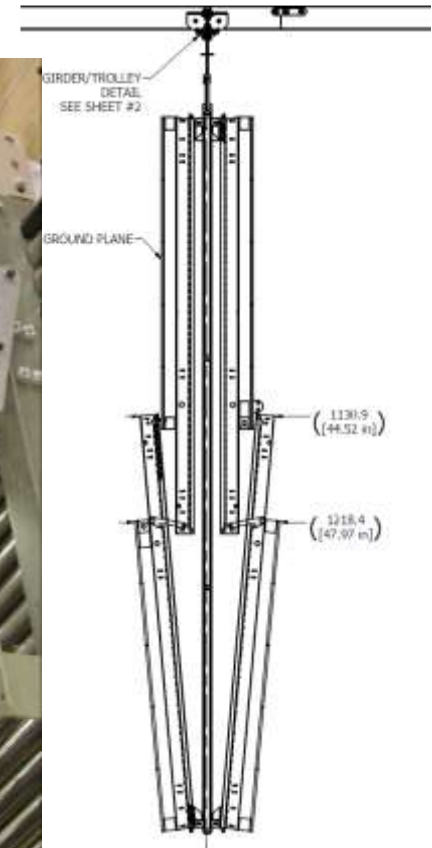


Tight! When the final FC deployed



Access for Deploying Bottom FC

Deploying the bottom field cage at Ash River we need to add the bottom latches, hook up the trolley winch and transfer the load of the FC to the trolley winch then remove the lifting brackets



CPA as it comes thru TPC

Belts and Suspenders

- During the transfer of the bottom FC to the lifting winch even with the winch cable snug it moves ~6-8" from the bolted position when it comes thru the TCO.
- We have added a safety strap that is bolted into place between the top and bottom FC so that it can not move past this position until the load is transferred to the Trolley winch



Access for the Top FC

- At Ash River we have not developed a way to access the top FC without standing on it. We have been blocking it up and laying a sheet of plywood across the I-beams. It kind of works but is not perfect. The new lifting bar (next slide) can be added before the CPA is mounted but the **current design of the latches forces us to add these after the bottom is deployed**
- Then we just have to figure out how to hook the lifting winch, we have a pole designed for fall rescues that I think would work or with a second lifting winch we could hook both FC's up

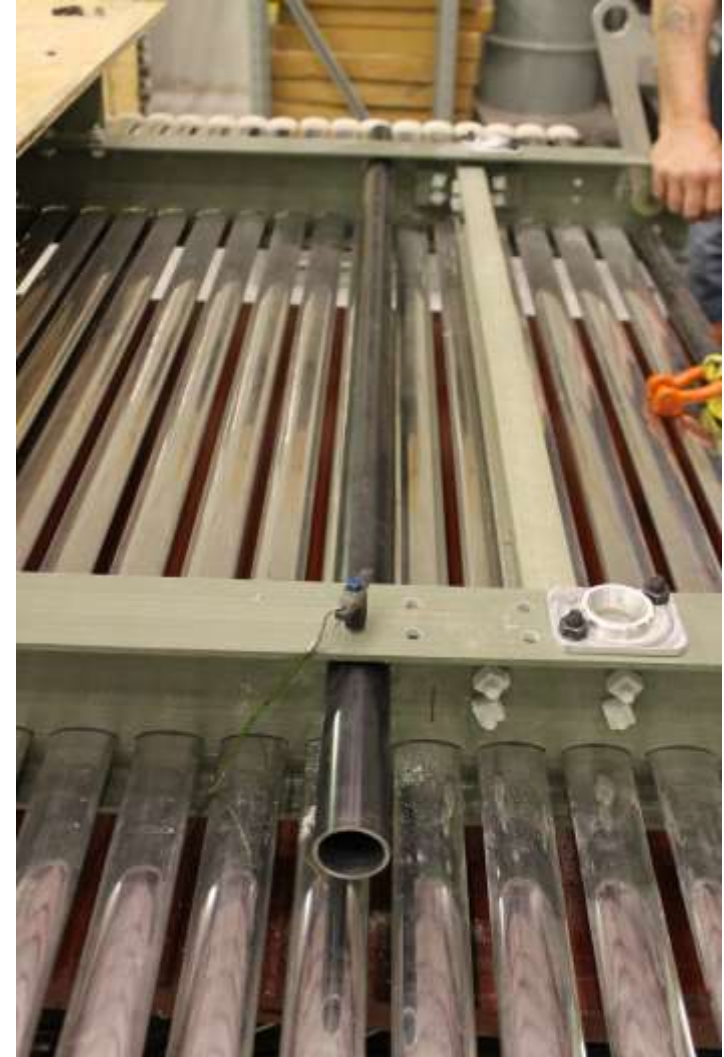
Still some work to do



If we can design the latches like the bottom ones so they can rotate straight up they won't hit the APA wires or get in the way

Top FC-Removable lifting pipe

- We added new lifting pipe and used a 3/8" detent pin so that the pin and pipe be easily removed when we are done
- This gives us excellent alignment with the trolley winch, but could use lifting lug to insure that we are lifting in the middle so FC doesn't twist



Equipment from Ash River

All of this will be documented
in DocDB 3054-TPC
installation

- Small 500 lb spreader bar from McMaster-Carr



- Special lifting fixture for APA which needs to be modified for clean room Trolley



- Numerous length rated standard lifting slings, clevis and shackles

Equipment from Ash River

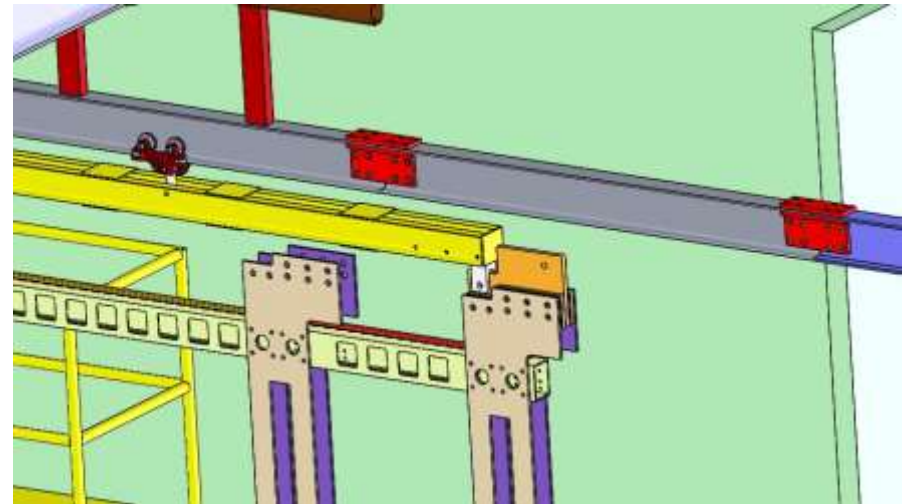
- Lifting winch-Stamped engineered design by Total Tool. They have now designed a 30% lighter weight on that is easier to take on and off
- The end wall system includes a Low profile Spreader Bar from Total Tool, a 3000 lb. rated swivel from McMaster-Carr a one ton trolley from Pacline



Other stuff we are bringing

- Job box full of hand tools, wrenches, sockets, ratchets, etc. that we expect we may need
- A few battery operated drills, grinder, etc.
- We will purchase local electric tools as needed if they can not be borrowed from CERN
- It is not clear yet but we may also be ordering the transition and transport beams

We would plan to crate all of this up and ship, I have not worked out any of the details on how to do this



What we need from CERN

All access equipment:

- Ladders or similar as shown in slide 11 for access in the TPC for work on Field Cages
- 10m Scissor Lift for Clean room- possible good to have 2 if we need to do things in parallel when the schedule gets tighter
- Scaffolding-This planning needs to start soon, on skids or wheels so that it can be moved without being taken down. Design a rod or something that scaffold can attach on the top?
- False Floor-This design work needs to begin now more on the next page