

# ProtoDUNE – DSS fabrication, assembly plans, QA, Transport

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DSS Review

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# Outline

- DSS fabrication plans
  - Beams
  - Trolleys
  - DSS Hanger
- Trial assembly plans
- QA
- Transport

# Beam fabrication plans

- Stainless Structurals, LLC can fabricate beams with holes. They have preliminary drawings and will review tolerances and provide a budgetary estimate and lead-time.
- Their beams will conform to ASTM A6 for dimensional tolerances and with material compliance and test reports per EN 10204 3.1.
- Beams will be dimensionally inspected and results documented upon reception.
- If necessary, the nut plate for mounting the APA and CPA can be machined to correct for beam deviations.

# Trolley fabrication plans

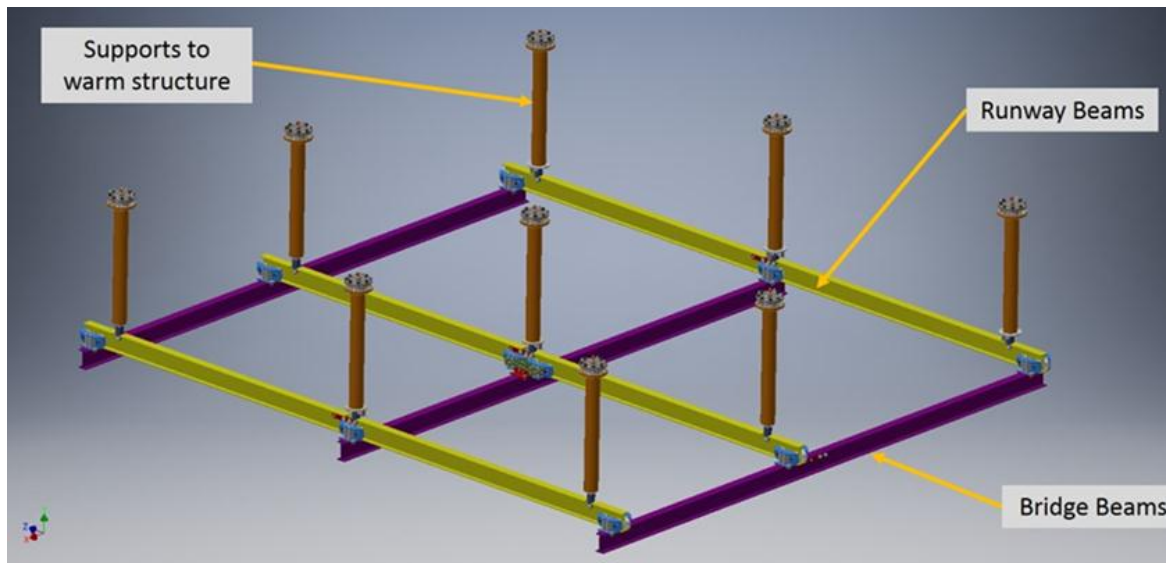
- Total Tool Supply, will quote protoDUNE steel and stainless steel trolleys to our specifications and will certify the ratings. First they will make Ash River trolleys.
- For protoDUNE
  - Beam trolleys
    - (6) 304 Stainless with Bushings for APA and CPA beams
    - (4) Plated steel with clean open bearings
  - (16) APA and CPA trollies
  - (2-4) Steel trolleys for the EW
  - spares ?

# DSS hanger fabrication plans

- The assemblies consist of custom manufactured parts and purchased parts.
- Custom manufactured parts will be fabricated by the University of Wisconsin or by local vendors.
- Wisconsin/PSL will assemble the DSS hangers in their vacuum shop
- Overall length of clevis pin hole to the top of the support rod will be precisely adjusted and locked

# DSS Assembly Plans

- Trial assembly at PSL
  - Confirm fit of beam assembly (Will not include hangers)
  - Survey to confirm that the detector mount points can be aligned
  - Test friction of the various trolleys



# DSS QA Plans

- Inspection - PSL
  - All incoming DSS material will be kept in an incoming storage location until it is inspected
  - Parts will be inspected against specifications and accepted and rejected per PSL quality procedures
  - Non-conforming materials will be segregated and tagged as non-conforming until a disposition is made.

# DSS QA Plans

- Process control
  - Components will be cleaned using our PSL high vacuum cleaning procedure
  - Components and assemblies will be kept clean during assembly and testing.
  - The DSS hanger will assembled and inspected per written procedures.

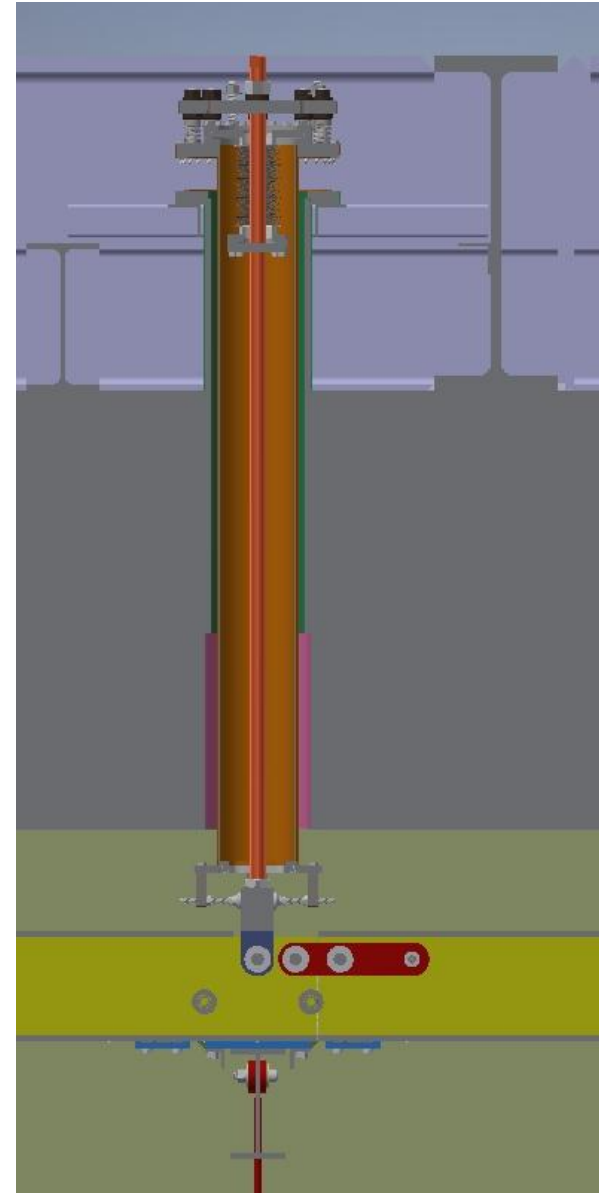


# DSS QA Plans

- Survey – CERN
  - DSS controls the position of the beam plug to the membrane wall
  - The DSS is designed to accommodate +/-2cm of positional error with respect to the adjacent membrane surface. The positional error is based on the axis of the flange projected to the membrane plane.
  - Early knowledge of the these flange locations may allow for components to be adjusted before they are fabricated.

# DSS QA Plans

- Testing - PSL
  - Load testing and documenting the results at the subassembly level will be done at PSL.
  - DSS hangers will be load tested individually at 1.50% with a dummy load.
  - The strength of the clevis connection to the beam will also be tested
  - The bellows assembly will be leaked tested at PSL and at CERN
  - PTFE /solid bearing material will be tested for purity in LAr



# DSS QA Plans

- Testing – CERN
  - Load testing of the installed DSS assembly will be done at CERN
  - Actuals loads of 1.25% of the TPC loads will be applied. (1.25% of the CPA bridge beam with FC on each beam?)
  - In order to compared the physical model to the mathematical model, actual deflections will be compared to the mathematical model

# Transport

- The “isolation stop” on the DSS will be locked to protect the bellows during shipment.
- All components and subassemblies will be bagged for cleanliness and package for protection and shipped via a container to CERN.
- A leak test fixture will be included.