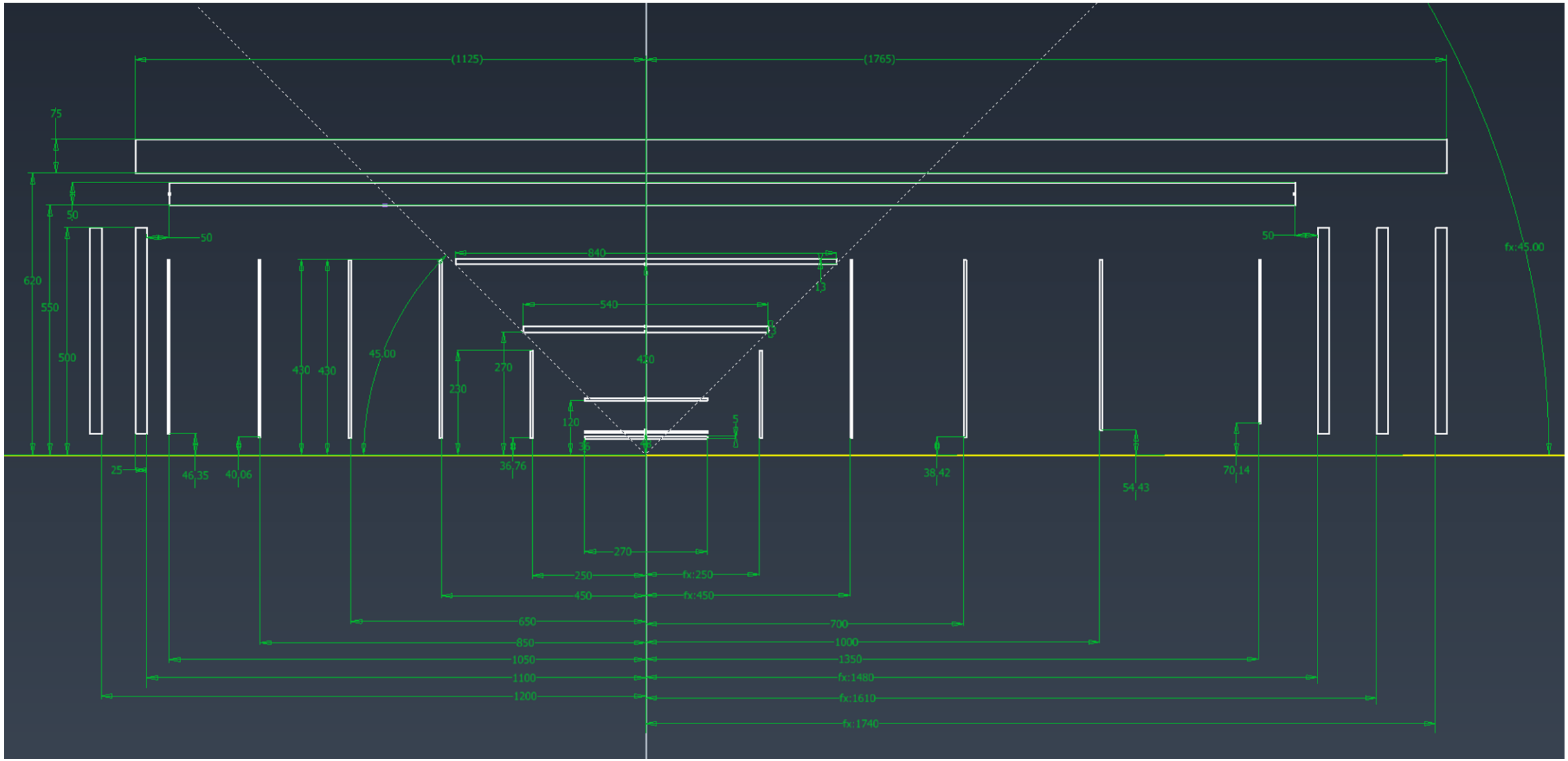
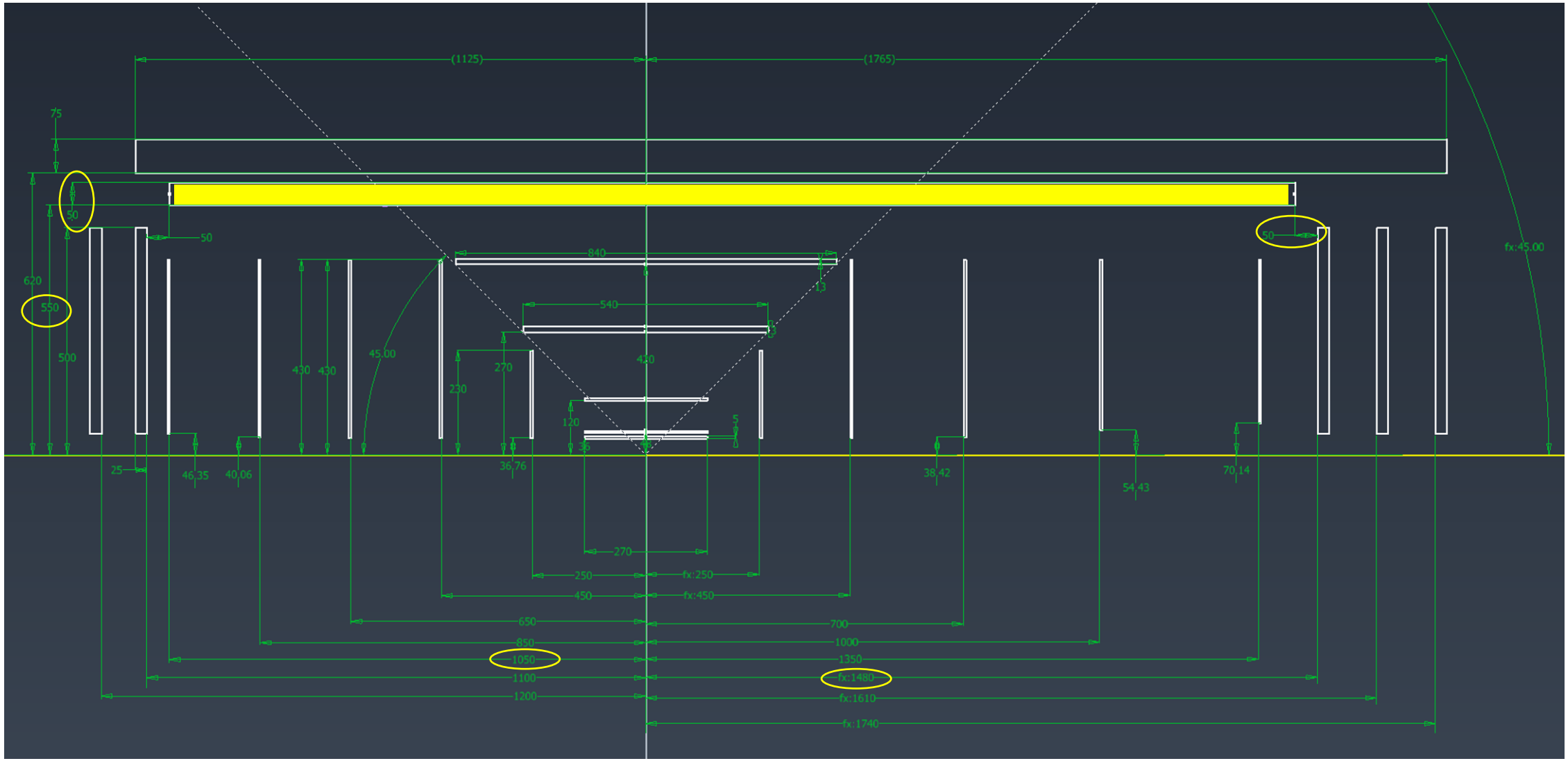
Detector Envelope Update

[Roland: TIC 3/11/2024]



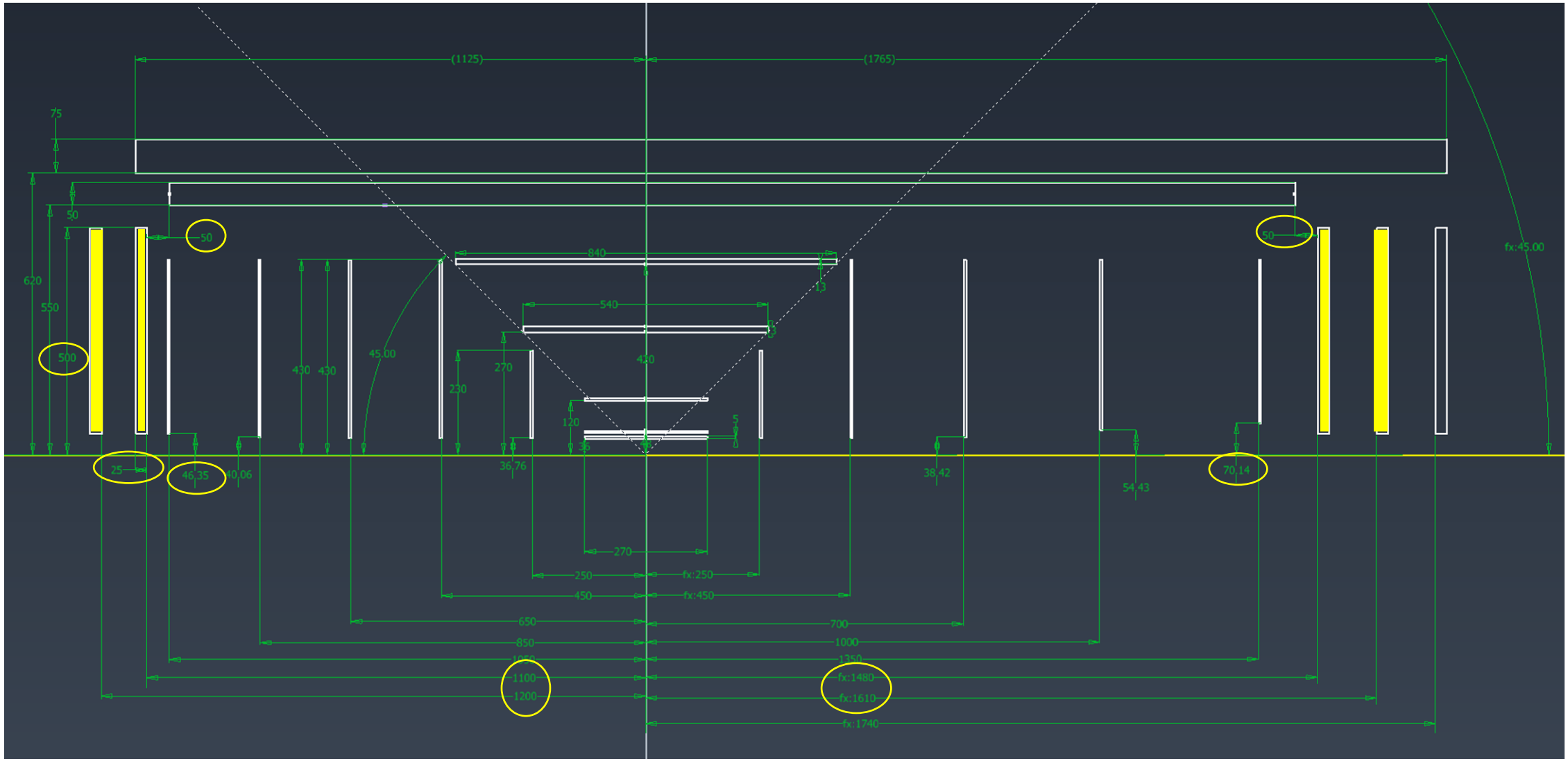
Detector Envelope Update: CyMBaL

[Roland: TIC 3/11/2024]



Detector Envelope Update: uRWELL-ECT

[Roland: TIC 3/11/2024]



Detector Envelope Update

Det.	Zmin [mm]	Zmax [mm]	Rmin [mm]	Rmax [mm]
CyMBaL	-1050	1430	550	600
uRWell-ECT (LD 1)	-1125	-1100	--	500
uRWell-ECT (LD 2)	-1225	-1200	--	500
uRWell-ECT (HD 1)	1480	1505	--	500
uRWell-ECT (HD 2)	1610	1635	--	500

❑ CyMBaL tracker

- Built using tube geometry → first curved ACTS tracking surface in ePIC
- EICrecon currently only handles planar surfaces from DD4HEP plugin (Issue #1330):
  - *[acts_init] [error] Warning: Attempting cast a Acts::CylinderSurface to Acts::PlaneSurface returns nullptr. This surface will not be added to the .obj output.*
- Need to extend EICrecon code to handle ACTS curved surfaces
- May also affect disks if using tube geometry

ActsGeometryProvider.cc

```
for (const auto &srfx: surfaces) {
    const auto *srf = dynamic_cast<const PlaneSurface *>(srfx);
    if (srf==nullptr){
      init_log->error("Warning: Attempting cast a {} to Acts::PlaneSurface returns nullptr.
      continue;
    }
    const auto *bounds = dynamic_cast<const PlanarBounds *>(&srf->bounds());
    for (const auto &vtxloc: bounds->vertices()) {
        Vector3 vtx = srf->transform(geo_ctx) * Vector3(vtxloc.x(), vtxloc.y(), 0);
        os << "v " << vtx.x() << " " << vtx.y() << " " << vtx.z() << "\n";
    }
```

Studies and Code Development

❑ Code Development Task

1. Extend EICRecon to use ACTS::CylinderSurface (Issue #1330)

❑ Detector requirement studies related to MPGD

1. Tracker Material budget
   - ➢ Quantify based on angular resolution response to different material budgets
2. MPGD spatial resolutions: Two methods to access needed resolution
   - ➢ Needed resolution based on angular resolutions at PID detector
     - Looked at for uRWELL-BOT and DIRC
     - extend to other PID surfaces
   - ➢ Track reconstruction performance in background embedded simulation → General workflow under development/analysis
3. MPGD timing resolutions
   - ➢ Track reconstruction performance in background embedded simulation, with timing information
     - Timing information needs to be used by ACTS

❑ **Goal:** May Campaign (5/6):

1. Have **detailed CyMBaL** and ***μ*RWELL-ECTs** implemented and **contributing** to **track reconstruction**
2. Initial updated digitization scheme