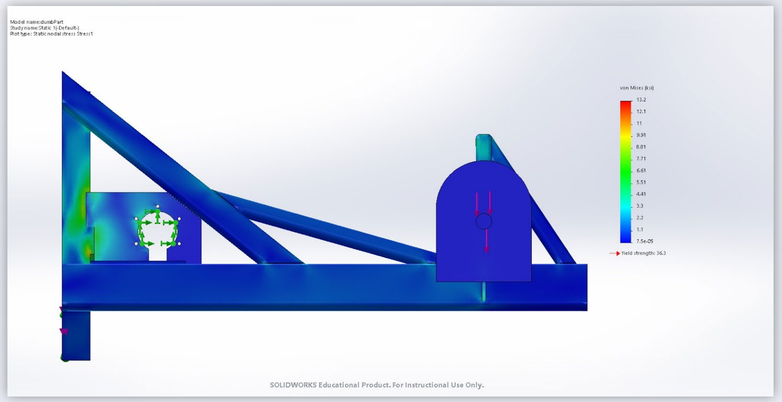
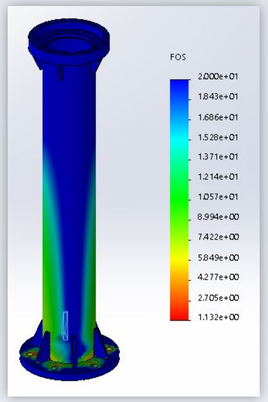
Radio Telescope Mechanical Design

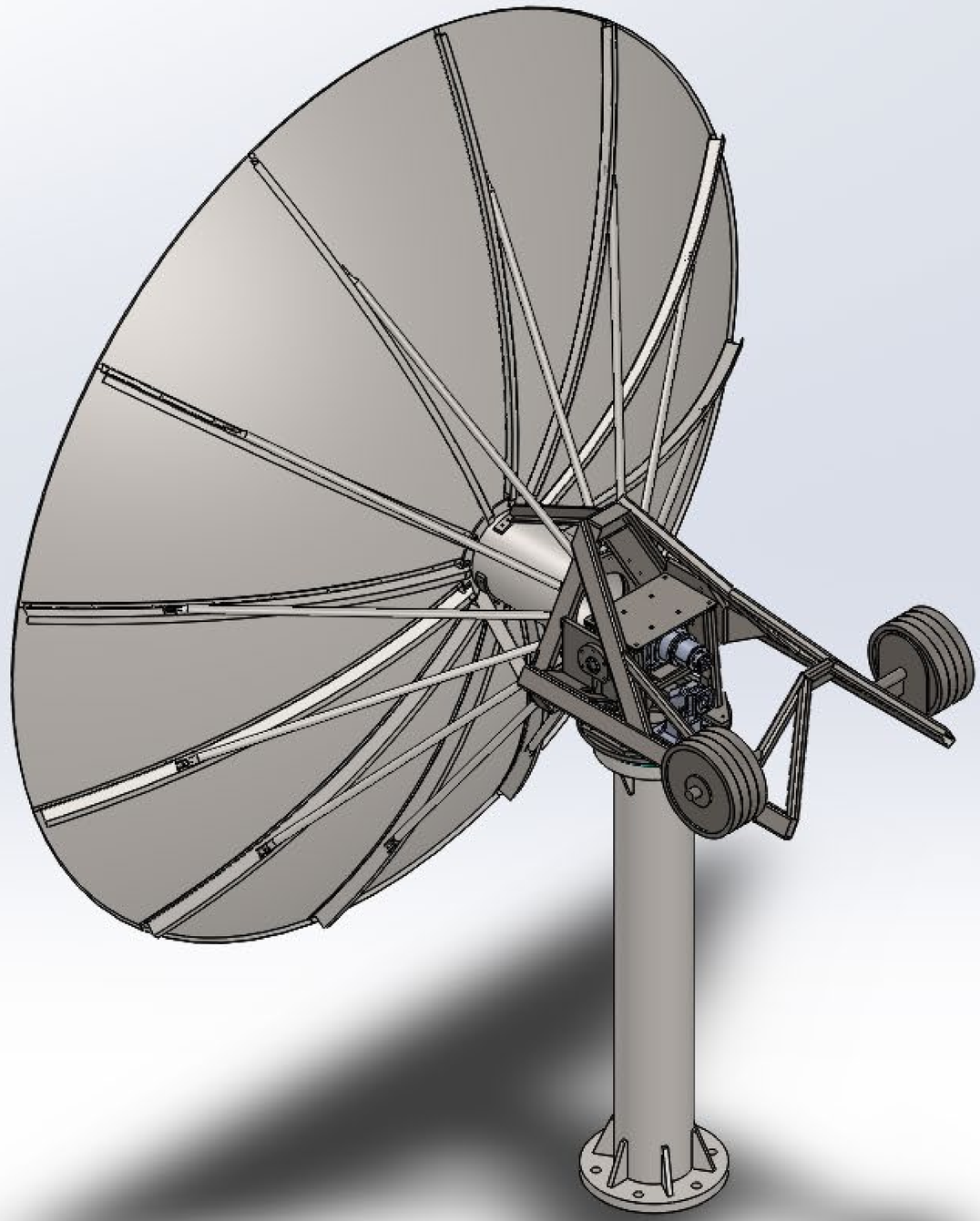
The 2018 radio telescope capstone team is designing a remote controlled, remote accessible, auto tracking, and auto locating 4.5 meter radio telescope for the York County Astronomical Society (YCAS). This telescope will be installed in John Rudy County park beside the current observatory. The telescope will serve as an educational and research instrument for YCAS.

Design Requirements

Remotely controllable
2 axes of freedom
Acceleration time of 0.5s
$\omega_{Elevation}$ = 3°/s
$\omega_{Azimuth}$ = 18°/s
Precision = 0.1°
Withstand 110 mph winds
Precise in 20 mph winds







Finite Element Analysis confirms complex geometries in the design are suitable for fabrication and installation. The triangle assembly connects to the elevation shaft for lateral dish movement. The counterbalanced design allows for ease of motion from the motor torque. This piece is the critical connection to the hub/dish and the counterbalances.

The post is 9ft tall to allow the dish to sit 2ft from the ground at 90 degrees. FEA shows the max stresses at the bottom which is consistent in assuming it as a cantilever beam. The large slewing ring sits in the seat at the top and rotates it azimuthally in the longitudinal direction.