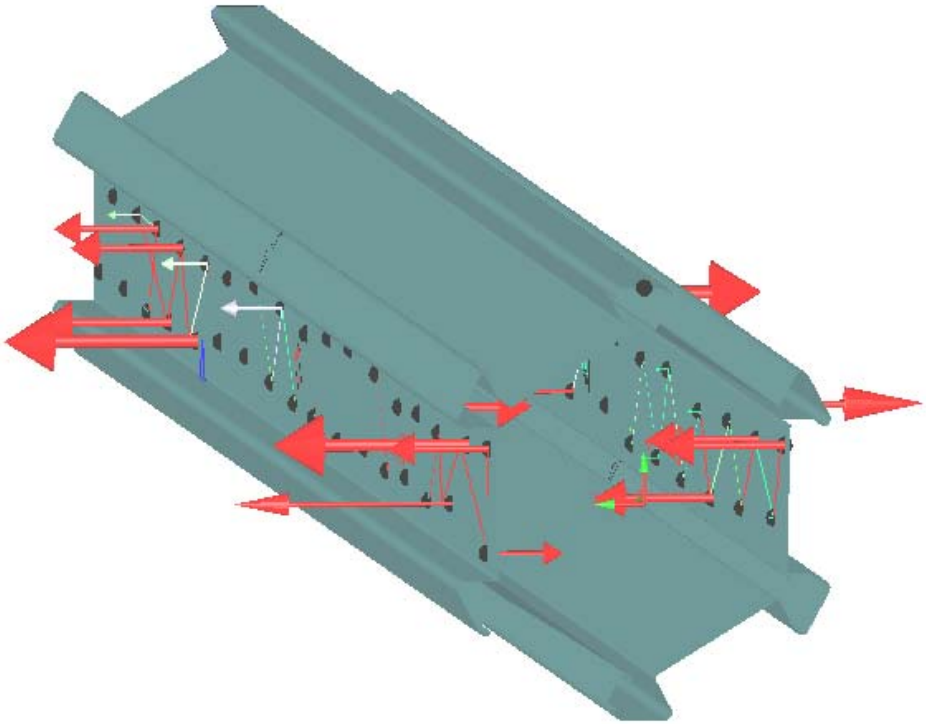
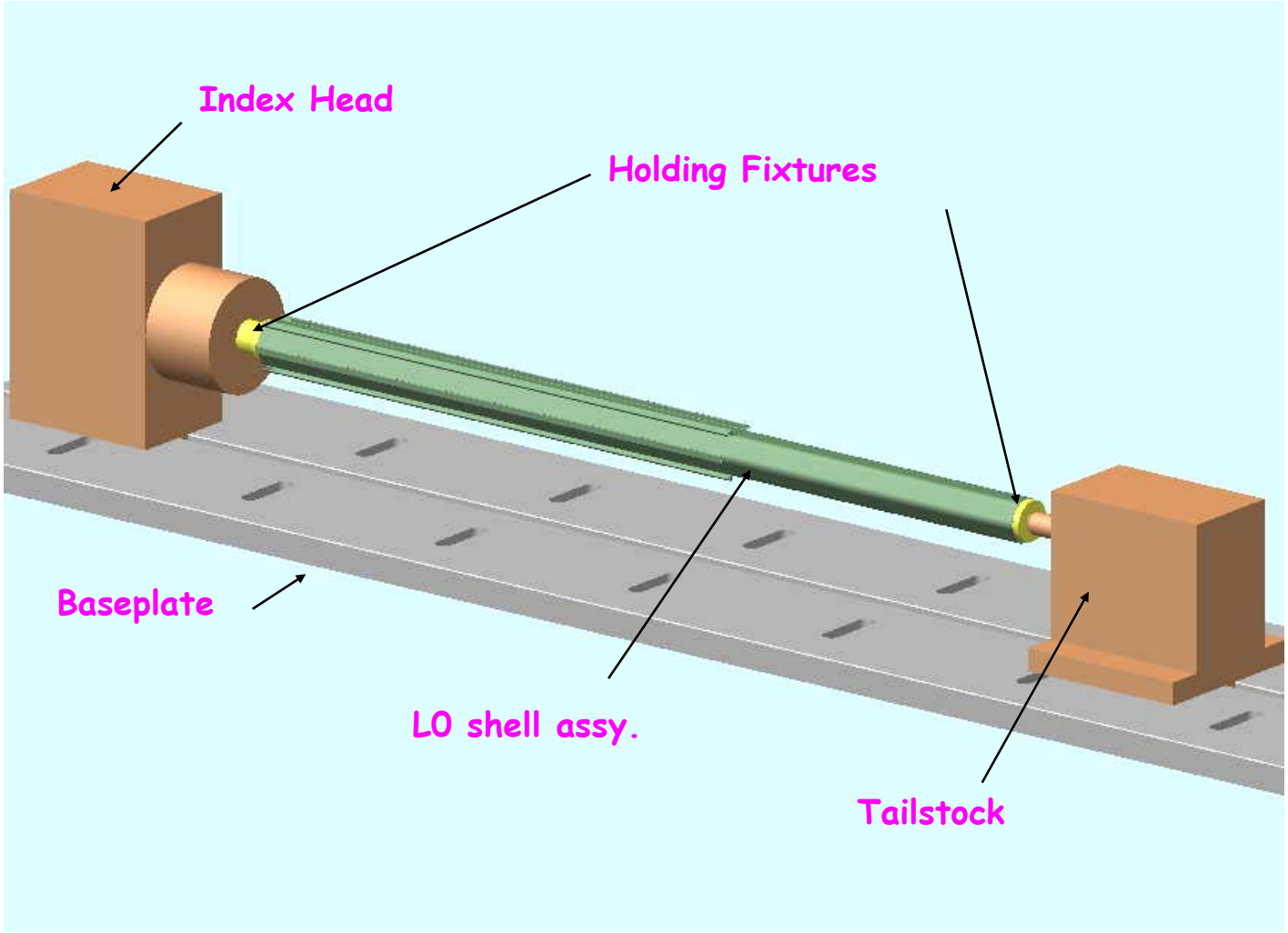
L0 Support Structure Measurements

- Measurements taken of outer surface on Brown and Sharp CMM. Inner shell not shown.
- PC Dimas v3.5 software allows direct comparison to solid model.
- Measurements also taken of prototype mandrels. Comparative analysis between assembled part and mandrels not yet complete.

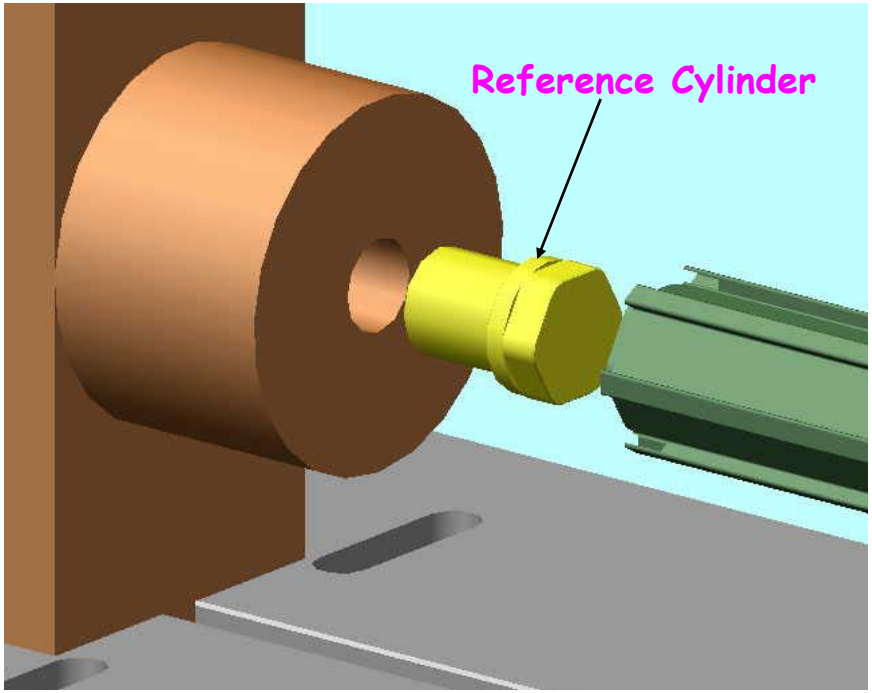


Arrow magnification 1000x

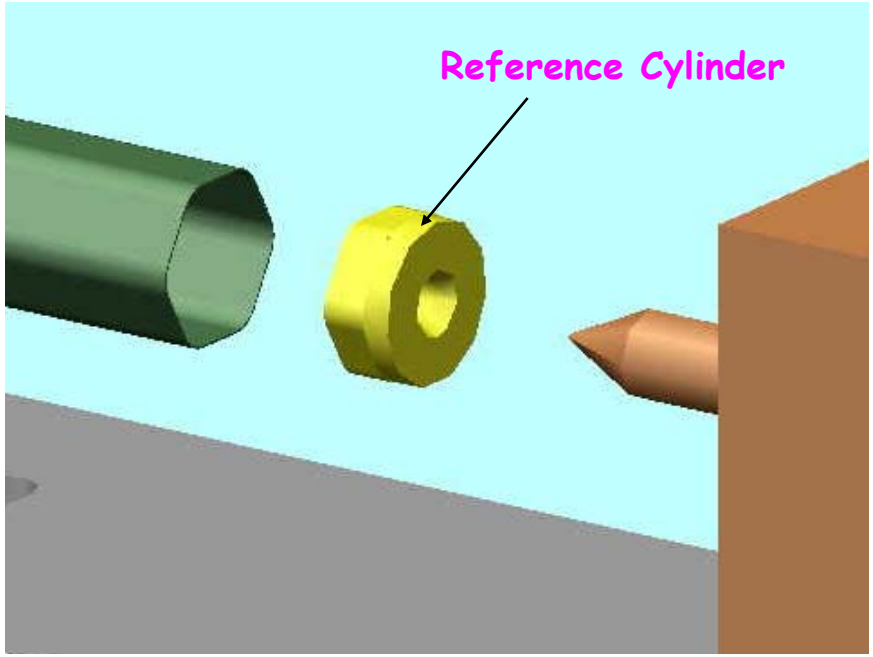
Measurement Setup



Measurement Setup



- Tailstock allows application of axial force to prevent part movement during measurement.



- CMM establishes central axis by measuring reference cylinders.

Analysis

- Determine flatness and radial location of sensor mounting planes on assembled support structure. Limited access to CMM before shipment to Fermilab resulted in only the A layer planes being measured.

- Compare to measured mandrel dimensions; look for trends. Analysis in progress.

- Compare glued thickness of inner/outer shell with target gap defined by assembly tooling.

0°, 180° Plane Measurements

- DIM FLAT1= FLATNESS OF PLANE LH_PLN UNITS=MM
- AX NOMINAL MEAS MAX MIN DEV
- M 0.000 0.081 0.034 -0.047 0.081

- DIM FLAT2= FLATNESS OF PLANE RH_PLN UNITS=MM
- AX NOMINAL MEAS MAX MIN DEV
- M 0.000 0.091 0.051 -0.040 0.091

- DIM LOC1= LOCATION OF PLANE LH_PLN UNITS=MM
- AX NOMINAL MEAS MAX MIN DEV
- X 17.350 17.330 17.371 17.281 -0.020

- DIM LOC2= LOCATION OF PLANE RH_PLN UNITS=MM
- AX NOMINAL MEAS MAX MIN DEV
- X -17.350 -17.335 -17.294 -17.390 -0.015

- DIM DIST1= 2D DISTANCE FROM PLANE RH_PLN TO PLANE LH_PLN PERP TO PLANE LH_PLN, UNITS=MM
- AX NOMINAL MEAS MAX MIN DEV
- M 34.700 34.660 34.721 34.614 -0.040

60°, 240° Plane Measurements

- DIM FLAT1= FLATNESS OF PLANE LH_PLN UNITS=MM
- AX NOMINAL MEAS MAX MIN DEV
- M 0.000 0.065 0.030 -0.035 0.065

- DIM FLAT2= FLATNESS OF PLANE RH_PLN UNITS=MM
- AX NOMINAL MEAS MAX MIN DEV
- M 0.000 0.100 0.059 -0.040 0.100

- DIM LOC1= LOCATION OF PLANE LH_PLN UNITS=MM
- AX NOMINAL MEAS MAX MIN DEV
- X 17.350 17.326 17.356 17.291 -0.024

- DIM LOC2= LOCATION OF PLANE RH_PLN UNITS=MM
- AX NOMINAL MEAS MAX MIN DEV
- X -17.350 -17.326 -17.277 -17.385 -0.024

- DIM DIST1= 2D DISTANCE FROM PLANE RH_PLN TO PLANE LH_PLN PERP TO PLANE LH_PLN, UNITS=MM
- AX NOMINAL MEAS MAX MIN DEV
- M 34.700 34.647 34.706 34.598 -0.053

120°, 300° Plane Measurements

- DIM FLAT1= FLATNESS OF PLANE LH_PLN UNITS=MM
- AX NOMINAL MEAS MAX MIN DEV
- M 0.000 0.101 0.046 -0.055 0.101

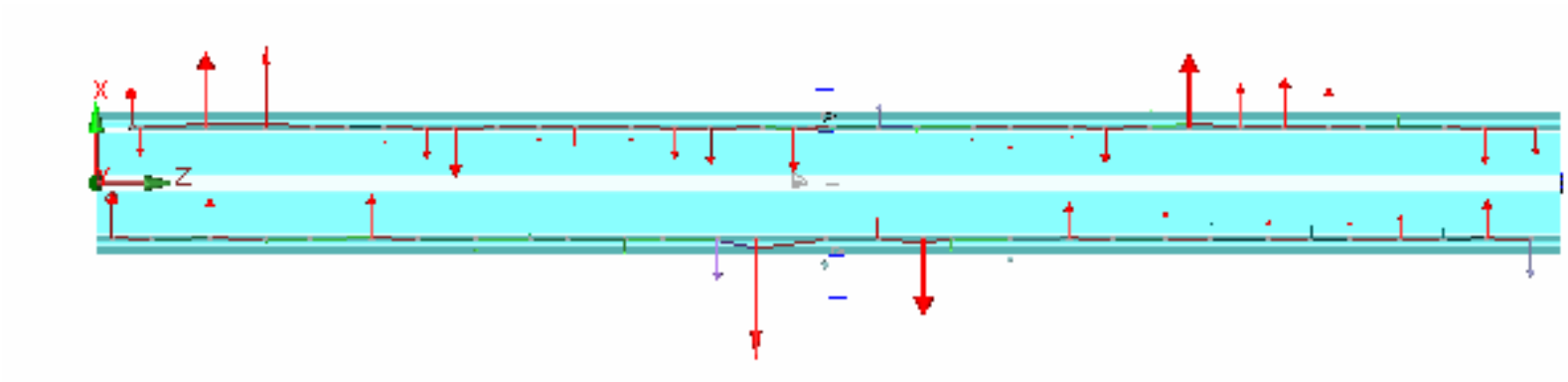
- DIM FLAT2= FLATNESS OF PLANE RH_PLN UNITS=MM
- AX NOMINAL MEAS MAX MIN DEV
- M 0.000 0.138 0.063 -0.075 0.138

- DIM LOC1= LOCATION OF PLANE LH_PLN UNITS=MM
- AX NOMINAL MEAS MAX MIN DEV
- X 17.350 17.362 17.411 17.305 +0.012

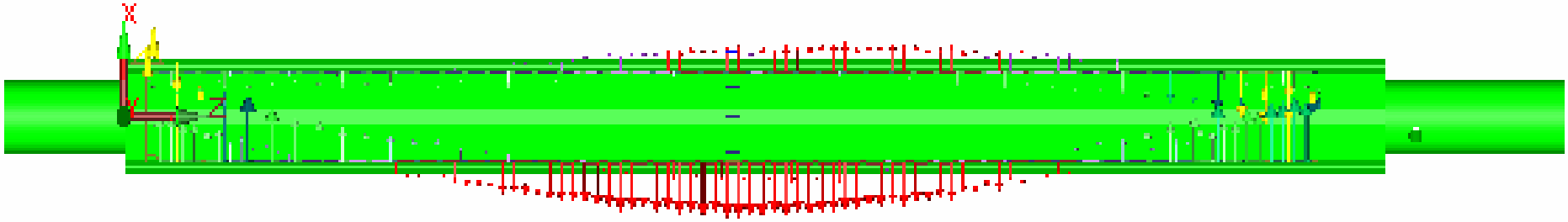
- DIM LOC2= LOCATION OF PLANE RH_PLN UNITS=MM
- AX NOMINAL MEAS MAX MIN DEV
- X -17.350 -17.362 -17.285 -17.428 +0.012

- DIM DIST1= 2D DISTANCE FROM PLANE RH_PLN TO PLANE LH_PLN PERP TO PLANE LH_PLN, UNITS=MM
- AX NOMINAL MEAS MAX MIN DEV
- M 34.700 34.720 34.788 34.641 +0.020

Graphical Comparison



L0 Structure



L0 Castellated Mandrel