METROLOGY OF THE OTE CYLINDER #2 (DRAFT)

J.V. Civera, L. Sospedra, C. García, P. Modesto, et al. **28.03.06**

- **Introduction**

We remeasured the mandrel diameter before assembling the second OTE. This is necessary because the mandrel was collapsed to extract the first OTE.

The mandrel mean diameter was 1195.65 mm (around 150 microns smaller than previously) which accommodated well our aims.

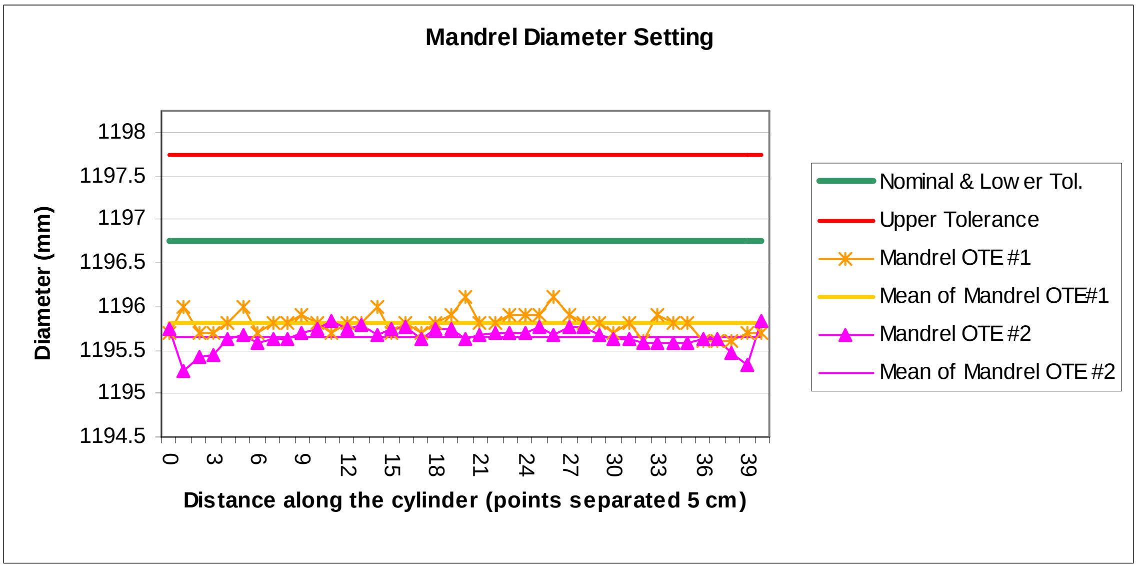

Figure 1

- **Results of OTE outer diameter**

Results are good, having a flat cylinder around its nominal value before gluing tabs and flanges, and well inside tolerances after.

Just the front flange section resulted slightly oversized before gluing flanges, and undersized after.

We have noticed that all the cylinders we have assembled show a bigger diameter just at the two endings. This is probably a natural tendency due to the edge discontinuity. This time we applied extra pressure (with cargo straps) during vacuum gluing trying to reduce this effect, although we could not avoid it completely.

In order to glue the front flange without having to add any extra carbon fibre chip (as in the first OTE), we also used a cargo strap during gluing of the front flange fibres, which caused a noticeable diameter change in the front flange section.

The advantage about not adding extra material is that the overlap with the linked carbon fibres is bigger than if it is added, like in OTE #1.

The drawback is that at the front flange and nearby sections the outer diameter results under nominal value, although this should not pose a problem for assembly.

The graph also shows an offset along most cylinder length, between measurements made before and after gluing flanges and tabs.

We are not sure about the reason for this effect. Maybe we measured the cylinder too soon just after vacuum gluing, and it is due to some kind of later material relaxation. The measurements after gluing tabs and flanges were repeated several times, obtaining equivalent results.

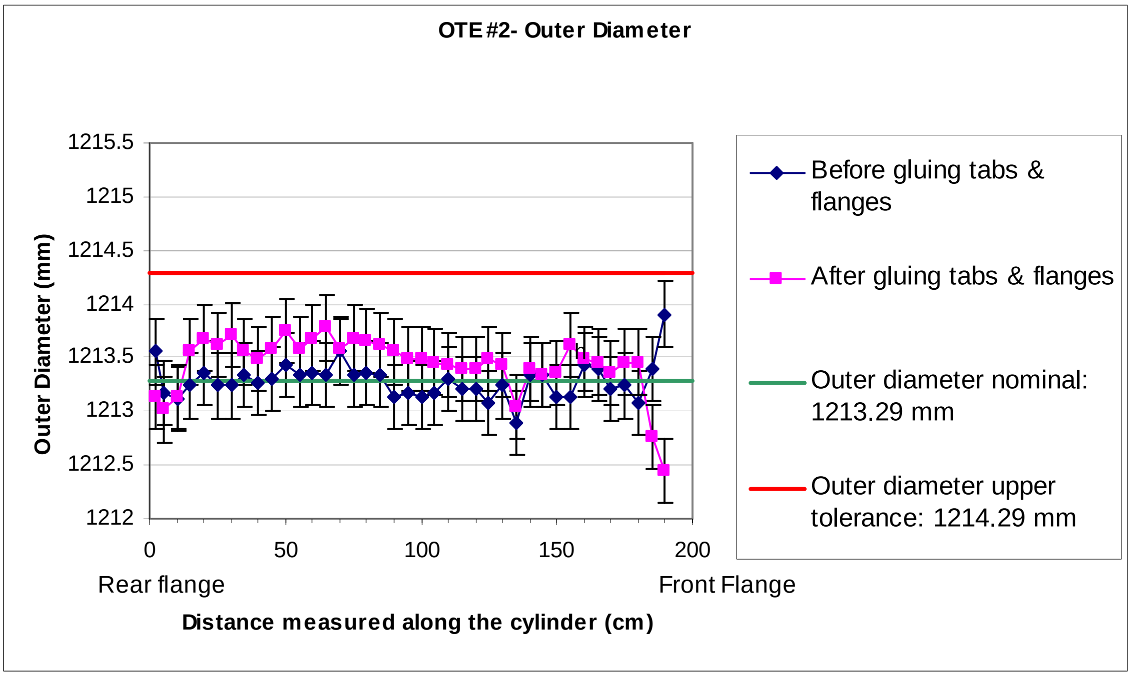

Figure 2

To join electrically the outer Cu layer to the internal Al layer, we glued 8 tabs of Cu-Kapton evenly spaced at 45º at each ending. Those tabs now include a jagged chromium strip to ensure good electrical contact, so they are some thicker (thickness around 450 microns) than the ones used for the first OTE.

In order to estimate the contribution of these tabs to the mean diameter, we made a test with an old prototype (on the mandrel) measuring its diameter before and after gluing the tabs.

The contribution turned out to be negligible (compared to the measurement accuracy), so we have not corrected the measurements related to tabs thickness, given that their effect is predominantly local.

- **<u>Results of OTE inner diameter</u>**

Results are also good, as for the outer.

We have calculated the inner diameter subtracting the width of the Airex sandwich from the outer diameter. For this OTE the measured mean thickness was 8.08 mm, so the inner diameter results closer to the upper tolerance than the outer.

The inner diameter (referred to the Al-Kapton layer) at the front flange calculated this way is slightly under tolerance. In any case in that section the OTE assembly depends on the inner diameter of the carbon fibres.

The electrical tabs mentioned above should not pose a problem since they should not clash with the OTE mounting rails.

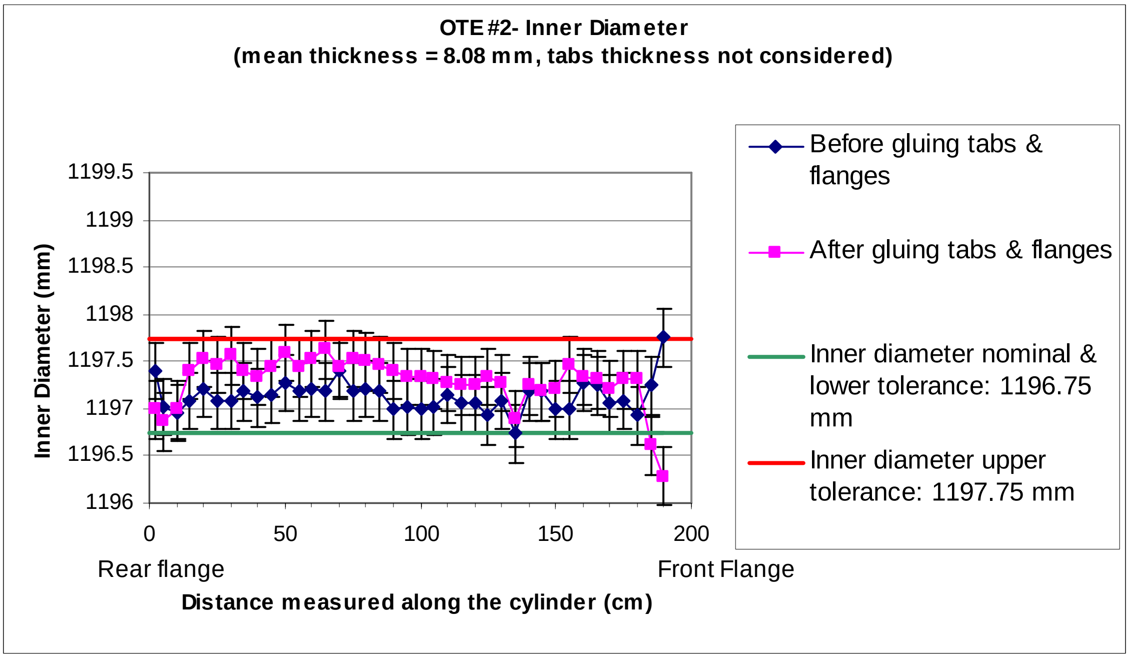

Figure 3

- **Comparison between first and second OTE**

Next figures show a comparison between first and second OTE results, for the outer and inner diameters after gluing tabs and flanges.

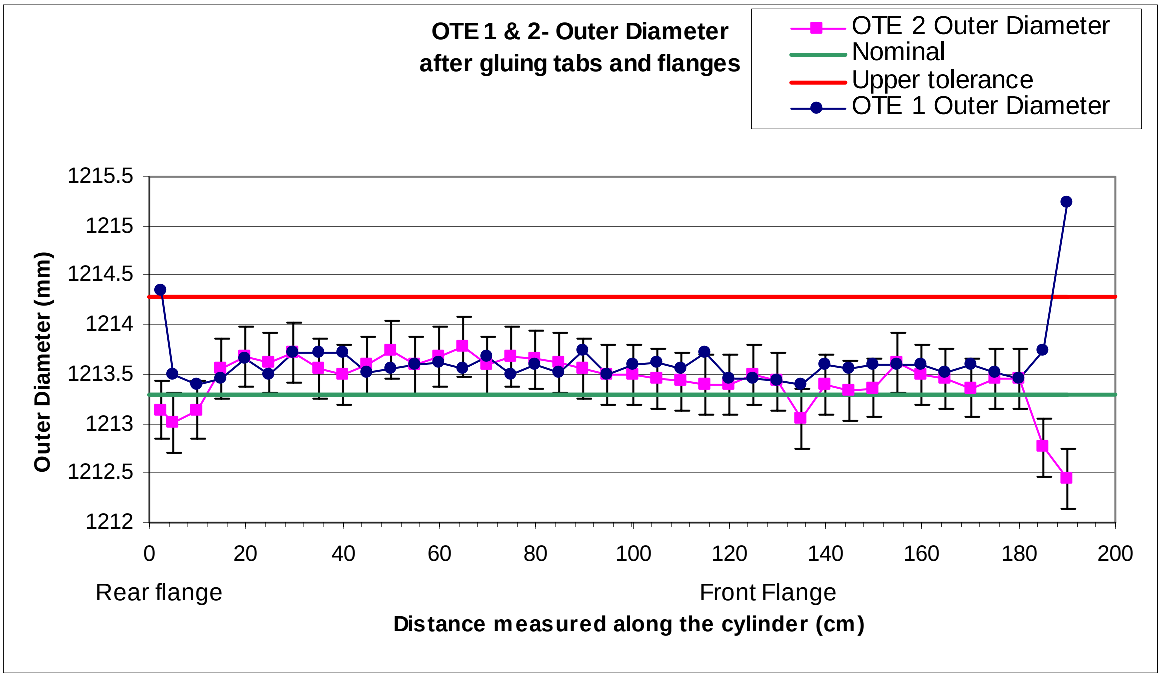

Figure 6

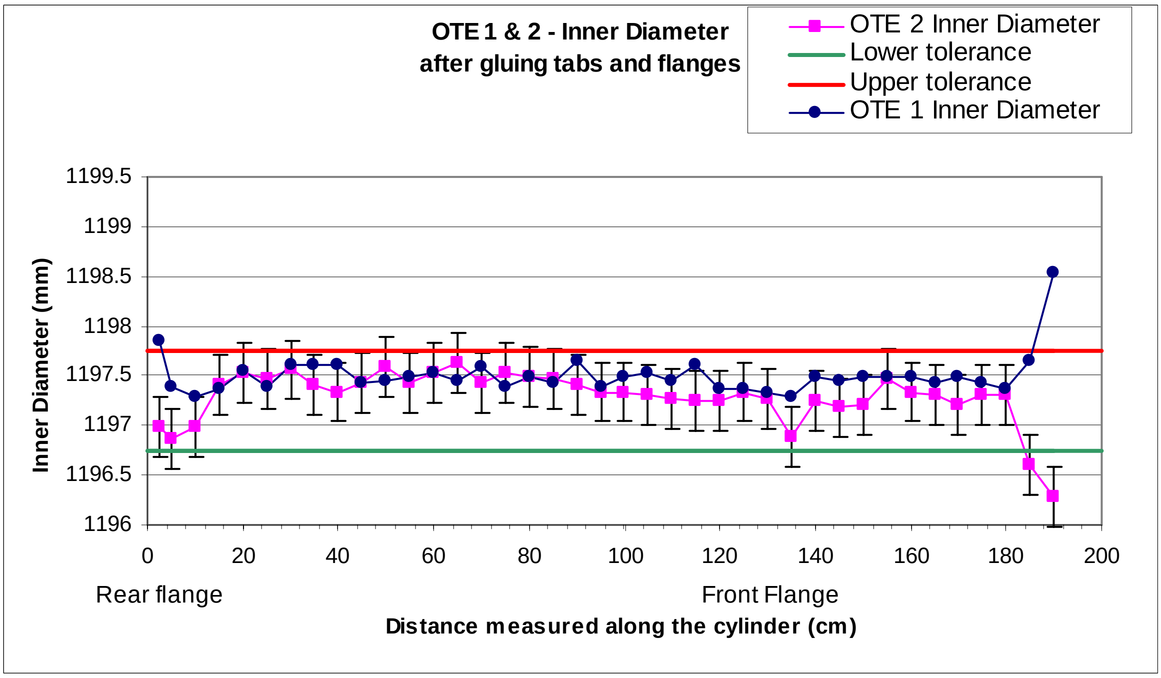

Figure 7

The diameters for the first and second OTE are quite similar, showing the biggest differences at the two endings. Especially at the front flange section, where for the second OTE we glued the carbon fibres with a cargo strap.

- **Conclusions**

We have shown the measurements of the diameter of the second assembled OTE cylinder.

These measurements show that the diameter is well located around its nominal value.

The diameter at the front flange section decreased after gluing the carbon fibres since we used a cargo-strap to accommodate the OTE diameter to the fibres without adding extra material.