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From: Harman, MR (Mark) - SSTD
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To: 'alma-receiver@eso.org'
Subject: Vacuum vessel end plate deflections

All

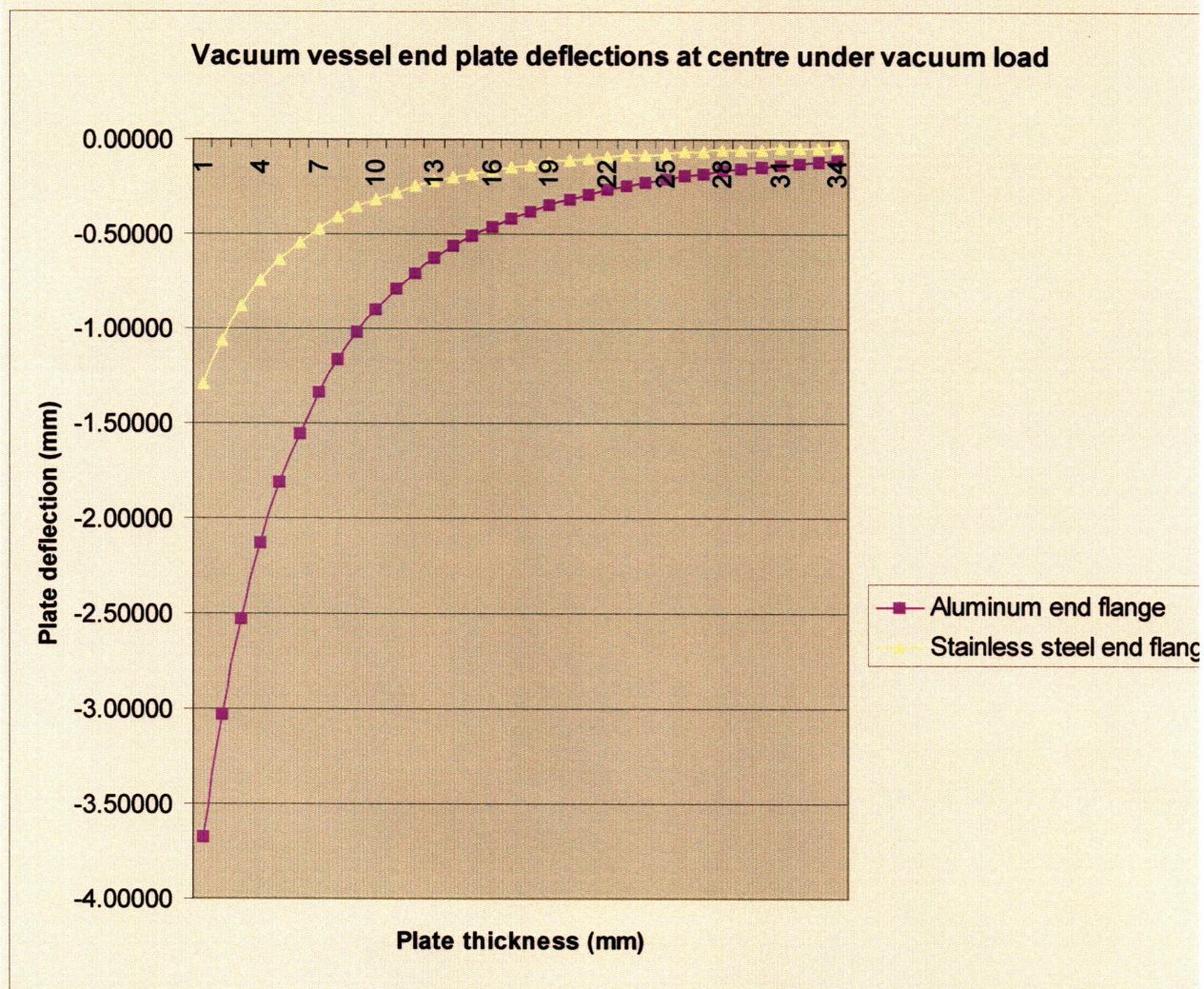
The JRDG has requested that Rutherford Appleton Laboratory provide some estimates on the vacuum vessel deflection for RF alignment purposes before tomorrow's teleconference.

Please find below estimated deflections of the vacuum vessel end flanges under vacuum load using both stainless steel, aluminium.

For a first order estimate I have made the following assumptions.

The vacuum vessel is a solid flat disc.

It is unsupported over a diameter of 950mm.



The use of stainless steel provides greater stiffness but there is a mass penalty using this material. I will calculate some revised mass estimates to quantify this.

The cartridge insertion apertures & window apertures will increase the deflections but this is difficult to quantify accurately using hand calculations.

Increasing the stiffness of the flanges and minimising deflections further could be provided by

- The rigid attachment of the Cartridge base flanges to the vacuum vessel via cartridge insertion apertures.
- The addition of support ribs which are welded to the flanges
- A central strut through the centre of the vacuum vessel could provide additional support .

Please note these are very provisional estimates & but should allow a base line material selection
We will be building a FE model of the Vacuum vessel so as to accurately predict any deformations and to evaluate the effects of any vessel re-enforcing if required at a latter date
The calculations will assist us to quantify some of the results from the FE model.

Any comments or questions would be much appreciated

Regards

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