

LBT Project: Primary Mirrors

New Honeycomb Pattern: Stress Checks in Operative Conditions (Gravity Loads)

Object of this 2nd addendum to the rep.#157 is to update the local stress checks due to the gravity loads in the LBT primary mirrors.

In the calculations reported in the rep.#157, the local stresses were evaluated considering the force distribution transmitted by the loadspreaders placed erroneously at the backplate midplane.

In the follows the force distribution at the RTV-glass interface are considered, so, being the offset between midplane and interface equal to 12.5 mm, smaller local bending moments act on the refined FE model and consequently smaller stress peaks occur.

The support pattern considered is the 94.6a reported in figure 1 of the Addendum to the rep.#157.

The optimised supporting forces with the mirror zenith pointing and horizon pointing are reported on pages 5-6 of the Addendum to the rep.#157.

The force distribution transmitted by the loadspreaders at the RTV-glass interface are reported on the tables 1 and 2 of the Rep.#156, respectively for 1000 N in the axial direction and 1000 N lateral. These forces/moments were evaluated considering the RTV mechanical properties named Experimental in the Rep.#152.

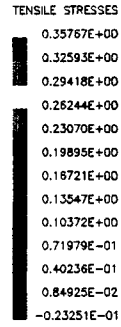
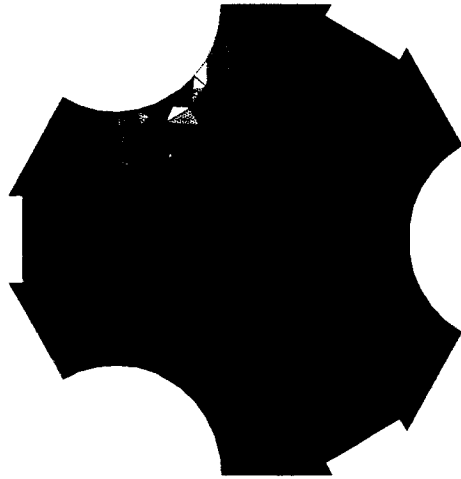
The stress checks have been performed for each regular puck (see figure 7 on rep.#157) for five elevation angles (0-22.5-45.-67.5-90 degrees). The maximum stress equal to 0.44 MPa occurs for mirror horizon pointing (0°). In the old checks we erroneously obtained 0.54 MPa as maximum stress peak.

In figure 1 are reported three typical stress patterns obtained for mirror horizon pointing; the second one gives the maximum principal tensile stress (0.44 MPa).

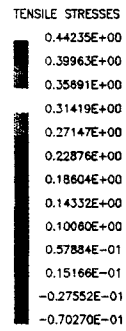
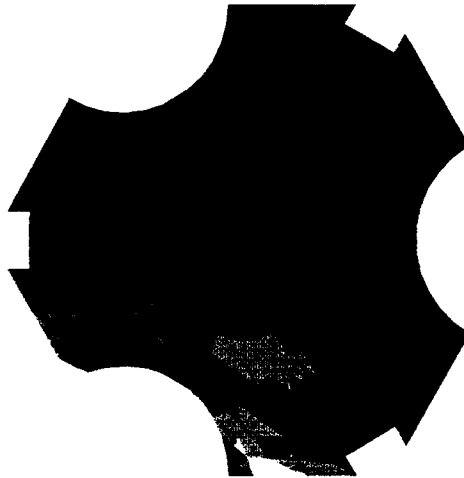
In all these cases the maximum stress occurs around the ventilation hole and they are produced by the combination of:

- local bending effects (the membranal stresses gives small contribution);
- stress deviation and consequent concentration due to the local geometry (local).

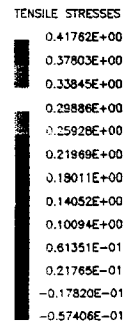
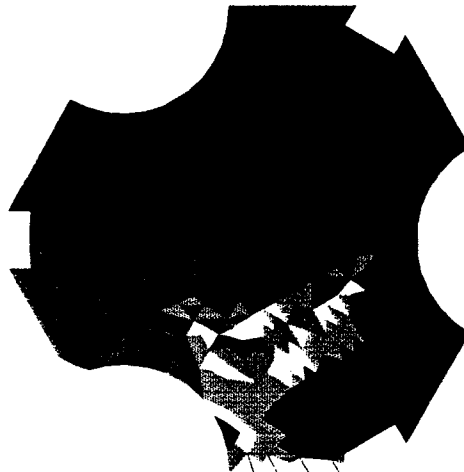
In the third plot we can notice also bending local stresses at the puck location.



SUPPORT NUMBER = 2 el. angle= 0.0 type = 3 puck num. = 2 node = 10
SECTION WITH PLANE Z= 24.98



SUPPORT NUMBER = 129 el. angle= 0.0 type = 3 puck num. = 3 node = 24514
SECTION WITH PLANE Z= 0.00



SUPPORT NUMBER = 118 el. angle= 0.0 type = 3 puck num. = 2 node = 22520
SECTION WITH PLANE Z= 0.00