Subject: thermal analysis of CCR with strong contact of lower ring with the back faces, Tsat=30°C
Date: Friday, August 4, 2017 at 9:17:38 AM Eastern Daylight Time
From: Antonio Paolozzi
To: David Arnold
CC: Giuliano Battaglia, Ignazio Ciufolini
Attachments: Sim 012 - 2017 07 27 - 1.0Inch.zip

Dear Dave,
Battaglia, that reads in cc, has performed some thermal analysis, the most interesting of which is the number 12. We assumed a satellite temperature of 30°C which may be possible with the new alloy. The thermal contact conductance is assumed very high from lower ring and back faces of thee CCR as well as from lower ring and the cylindrical part of the CCR. This will be an interesting case. The axial gradient does not change much eliminating the contact (-0.93 with high contact -0.73 with no contact).
If from your analysis the thermal behaviour is acceptable that will allow us to use the spring at the bottom the CCR. We will check also about the TIR issue but I do not expect large influence since only a very small portion of the back faces are touched.
The problem of the COTS CCRs is that the front face position is defined with a very large tolerance +/-0.25 mm. That means, to be sure to avoid concact of back faces with lower ring slanted surfaces, we need a gap of at least 0.5 mm. This could become 0.25 if we purchase twice as much CCR, but still we have a large gap to which we have to add at least another 0.2 mm for mechanical tolerance and a small thermal deformation. Such an half a millimiter gap will affect accuracy in ranging. What do you think?
Anyway if we can use a spring, the front face will be in contact with the teeth of the upper ring and no gap will be present, so higher accuracy can be expected.
Antonio