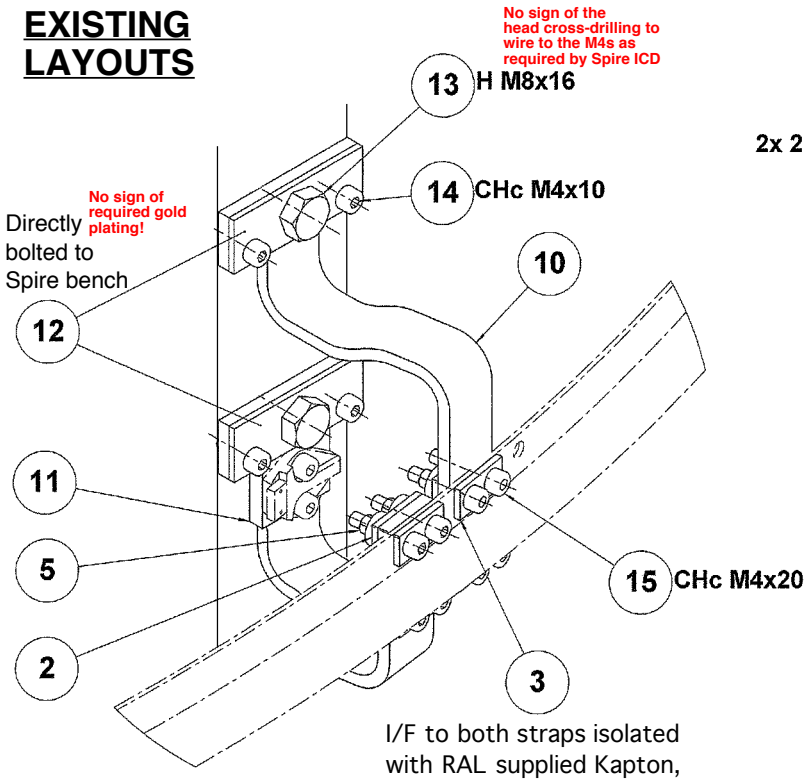
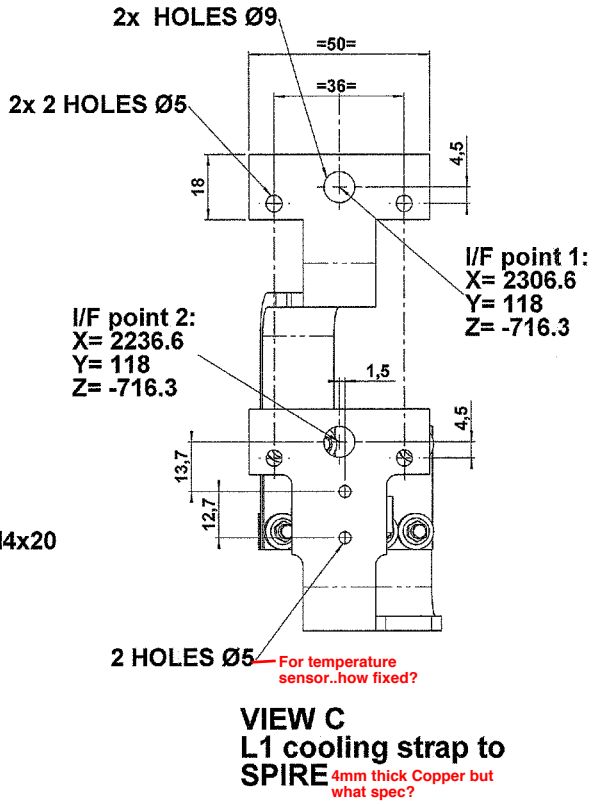




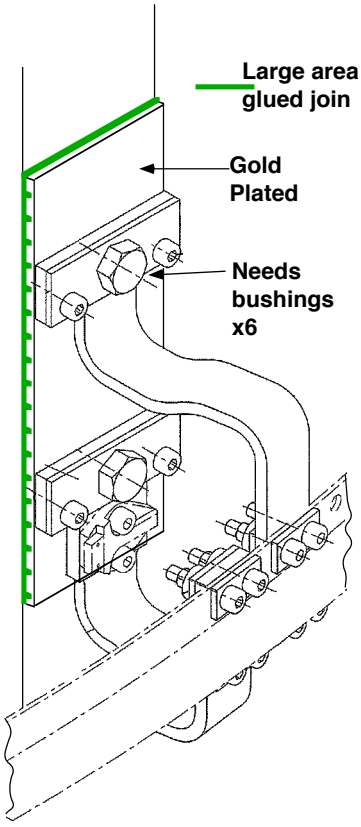
Dear Horst/Armin,

Last Friday Spire held an internal meeting to consider bolted interfaces, noting the poor experience we had with one during CQM testing. Non-Spire team person were present to advise.

The good, reproducable results readily available from soft-gold plated copper bolted interfaces were noted, even after re-mating.

The alchemy needed to make aluminium-aluminium interfaces work well was also mentiooned, together with Astrium's recent good results with 3 micron nickel underlays. Could you possibly send Spire either full technical details or, if proprietary, the plating firm's name.

It was noted that all fully annealed materials were very "interesting" to both intially clamp and to keep a pressure across the I/F after multiple temperature cycles.



We noted that Kapton insulated joints had shown a tendency to be unreliable insulators and that aluminium to copper bolted joints could worsen thermally due to differential expansion after temperature cyclings.

Given all these considerations we proposed to rework the L1 Spire interface slightly. The Kapton between straps and boil-off pipe would not be used and a 2mm thick plate would be bonded to the Spire optical bench.

This plate could be either aluminium or copper, copper suiting copper straps or aluminium suiting aluminium straps. The copper plate would be slotted in its reverse (as shown) to minimise stress on the bench but this would still leave an aluminium to copper joint at the pipe end.

Please could Astrium give a reaction to this note, and particularly a preference for plate material, before Spire raises an ECR.

Thanks

John

PS We know this interacts with the MGSE!