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Betreff: RE: CERN visit

Datum: 3. April 2017 um 16:39

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Dear Olivier,

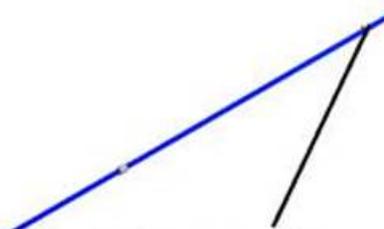
According to the situation that we can observe on the CO2 installation in the LHCb, the bottom line is working according to our assumptions, while the upper line has an additional fix support. We had intensive discussion about the issue- and the first thought is that it is associated with external supports- but as you have checked them – it is really difficult to find the reason.

Below find our answers and recommendation. In point three there is an analysis of stresses which shows that the system is safe for operation.

1. Definitely the system looks like there is a fix support (where there shall be any). We deliberated what are the possibilities of manufacturing or assembly error:
  - Not installing the compensator during manufacturing phase – rather unlikely as someone would have to weld instead of the compensator a piece of pipe- which was actually not readily available during production phase (you know – the welder would need to go and cut the pipe to the right length and weld it instead of the compensator).
  - We did not use any temporary internal supports for filed installation- so this is also not the case
  - The one section can not be installed inversely – it would mean that interconnection sleeve would not fit- so also very unlikely.
2. What could happen but none of the below is convincing- but worth checking:
  - Some blockade because of interconnection sleeve- perhaps it slipped and got stuck- **Please can you visually observed the interconnection sleeves-** they shall be in place and they should not be fixed permanently to the piping sections
  - The direction of cooling- I mean we thought if the flow direction during cool down has some role and it looked that it should not- but as we all know- engineering is sometimes tricky- **if possible can you try to do the same but with opposite flow direction?**
  - The reason for that situation may be that on each straight section we have 3 sliding supports- and many sections. Each of these supports gives us some force to counter the movement of the pipeline due to local resistance on the support. Because the upper line is suspended on the bottom line, these local resistances on the upper pipeline is larger, because the upper support moves the load on the two pipelines, resulting - due to the total number of sliding supports of like an extra fix support. **Just try with hand how “strongly” the piping is laying on the sliding supports to have an idea if the pipe can move freely.**
  - **You can try to dismantle two “suspicious” sleeves to look inside the interconnection- well for just visual observation,**
  - Each sliding shall be sliding- you have checked it that they are all ok;
3. Grzegorz analysed the system- with the additional fix support- with respect to stresses. It moves this is not an issue. Find below the results.

We performed analysis according to the real situation on site. The design parameters are taken into account (130bar, -45C). Due to the additional fixed point – the main issue is if it is still safe from thermal contraction point of view. 141,2 Mpa vaule (Fig.1 ) is bellow limit value (210,5 MPa). In case of the operation condition (20 bar -30C) the value is 95.9 MPa (Fig. 2).

11.2  
10.0  
1.90  
1.76  
0.24



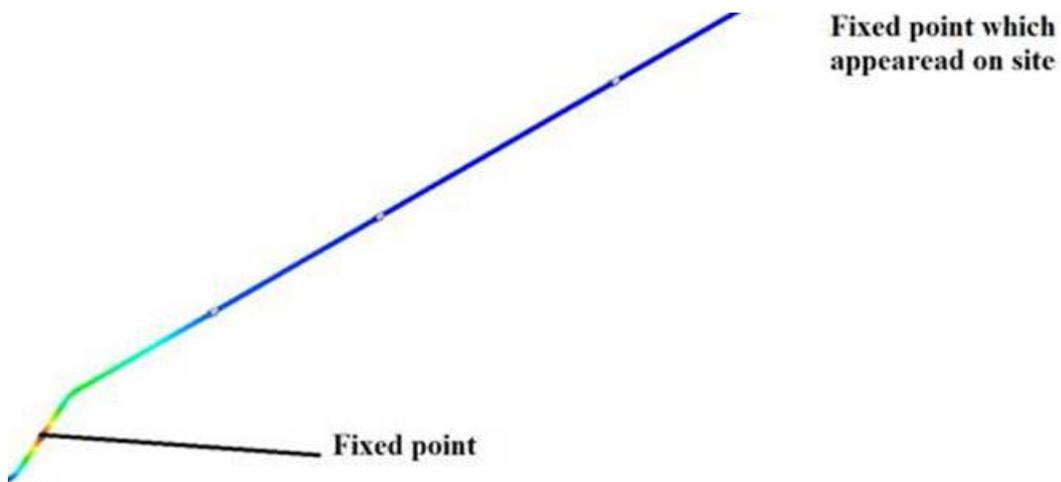


Fig. 1

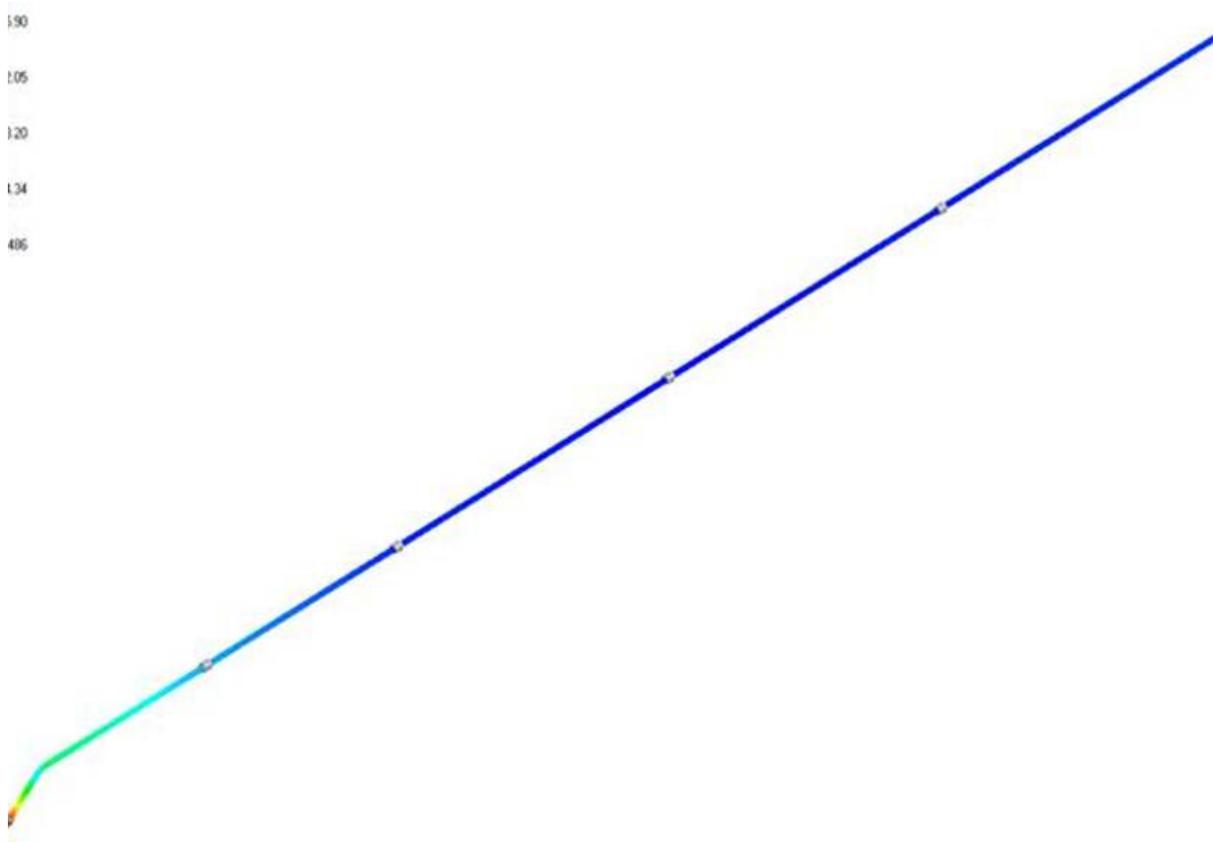


Fig. 2

Well we would like to avoid another trip to you- but if it is necessary we will do. Perhaps during the another work we do for CERN- we will be able to see the system in operation.

Best regards;

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