# Some questions and considerations about the magnet interfaces

Jost Luehning, 2011-12-09

## Interface Document

Who will finish the Interface Document?

What should be the purpose of the Interface Document?

Which content has still to be added, and which content might be deleted?

## Yoke – Platform Interface

In Darmstadt an acceleration of up to 0.75 m/s² in any horizontal direction has to be considered.

How does the platform react to a horizontal force?

How does the yoke react to a horizontal force?

On the interface pads there are not only normal forces.

There are shear forces which are about an order of magnitude lower than the normal forces. Can we neglect them? Should we specify whether the interface pads are connected rather stiff or rather loose in horizontal direction?

There are also moments of force (mainly in the form of an uneven pressure distribution on the interface pads). Only an FEM model comprising the yoke and the platform could give us the magnitude of these moments.

Under which circumstances…

… can we neglect shear forces and moments of force?

… would a simplified FEM-model be sufficient?

… do we need a very detailed FEM-model?

## Main obstacle for progress on the yoke-platform interface

Very large moment-of-inertia requested for the big platform beams (285 $dm^4$).

It was calculated by Alexander Makarov that 285 $dm^4$ are needed if any of the big beams would be supported only in the middle.

No calculation was presented for the case that at least 2 supports are active on both big beams.

## Yoke-Cryostat Interface

In the yoke-cryostat interface presentation on the September CM there were given the total forces between yoke and cryostat in all dimensions, the positions of the action centre of the forces, and a drawing at which positions the forces could be transmitted.

Fractions of forces which have to be taken by individual supports were not given.

What should be written in the Interface Document?

Proposal:

For the vertical forces 3 rigid supports and one elastic, preloaded support should be used.

Pre-load 20% ± 5% of the maximum weight (which is about 400 kN, ~40 tons), so the maximum load on the neighboring rigid supports would be 35% (provided that all supports have got the same distance to the centre-of-gravity)

Concerning the supports bearing the horizontal forces:

These forces may act in any direction, so there is not much benefit from a pre-load.

Number of axial supports: 4.
Maximum load on any axial support ±100 kN (half the total axial load - this is the worst case, in which 2 axial supports share all the axial load and the other two axial supports are completely redundant).

Number of supports in x-direction: 4.
Maximum load on any of these supports ±50 kN.