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The collaring test

The Fuji paper HS-50-130 MPa has been used.
The tests have been performed following the plan. The pressure has been increased progressively up to 300 bar in three pistons equivalent to a total force of 275 t, monitoring the displacements with micrometers placed in four locations at the sides of the magnet (Fig. 2).
During this test the deformation of the collaring beams have been measured also. The electrical resistance to ground has been monitored.

View from top
Measured displacements and deformations

Fig. 2 Measured displacements by the four micrometers

<table>
<thead>
<tr>
<th></th>
<th>C1</th>
<th>M1-2</th>
<th>C2</th>
<th>C3</th>
<th>M3-4</th>
<th>C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>At 275 t</td>
<td>Y0+53.14</td>
<td>Y0+54.65</td>
<td>Y0+53.24</td>
<td>Y0+52.82</td>
<td>Y0+53.27</td>
<td>Y0+52.81</td>
</tr>
<tr>
<td>Force released</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From these results, the collaring of the short model requires the involvement of end stoppers for reducing the beam deformation.
Results

- The pattern is regular along the central part of the aperture
- There is no pressure concentration in proximity of the coil ends
- The pressure in the coil ends is not detectable (< 50 MPa)

From these results it seems that the envisaged solutions (150 µm removed per coil in the mid-plane and reduction of thickness of tapered shims in the coil ends) should work.
600 t $\leftrightarrow$ 125 MPa average (rupture of G11)
550 t works

We could also remove 127 μm layer in the pole, so reducing the force to 450 t $\leftrightarrow$ 90 MPa average.
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• When I computed the needed material for collars, I supposed that the ratio between the weigh of needed material and the weight of the collar was 1.8 as for our experience with SIS300 collars.
• Now ASG has finalised the contract with Malvestiti and Nico is checking this number.
• At a first check it seems that this ratio is much higher (3 instead of 1.8), i.e. for each collar having a weight of 0.22 kg it is necessary a plate weighting 0.65 kg. If this is confirmed, for the prototype (considering three apertures) we need 16800 collars (margin 5%) for a total gross weight of 11 ton (not 7 ton as I previously indicated)
• I have asked Nico to re-check this number with Malvestiti because for me 2/3 of scrap is quite large (for SIS 300 having very similar collars the needed quantity for one collar was 0.415 kg).
• To this aim it is important the basic information is correct. According the information circulated the material is provided in coils having a width of 220 mm or 270 mm. This number is important for evaluating how much material we have to waste.
• Other information about the coils are ID=600 mm, OD=1000 mm, weight 1.2 ton.
• If all these numbers are confirmed, for prototype 10 coils are needed.
• For the series 7 ton per magnet are required (6 coils)For a total of 42 ton (36 coils).
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<tr>
<th>Decision</th>
<th>Process</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bore tube support</td>
<td>CERN/INFN meeting → Discussion with ASG</td>
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<tr>
<td>Voltage taps wiring and connection</td>
<td>Copper traces embedded in a flexible PCB. Procedure to be outlined</td>
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<tr>
<td>MIP and PCQ</td>
<td>CERN/INFN for MIP INFN/ASG for PCQ</td>
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<tr>
<td>Collar Instrumentation</td>
<td>INFN proposal CERN approval Collar modification</td>
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</tbody>
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