Strategy for measurements of Mo coating for collimators

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The life of a MoGr block

- Production of MoGr blocks
- Validation at CERN
- Coating at DTI
- Validation at CERN
- Assembly at CINEL
- Validation at CERN

Possibility to measure **uncoated** blocks and samples

Possibility to measure **coated** blocks and samples

Possibility to measure **collimator assembly**
Main facts

- 1 collimator jaw is made of 8 coated MoGr blocks (tapers are not coated)
- 1 batch: 20 MoGr blocks (2 jaws + spares) and 2 samples
- 10 batches in total (200 blocks including 20 spares)
- 1 uncoated batch sent to CERN per month from mid February 2019
- Batch sent to DTI for coating 2 weeks after reception (see planning in table below)
- Coating performed and batch sent back to CERN after 2 weeks
- Assembly at CINEL
- Final validation at CERN (see planning on the right)
The life of a MoGr block

Production of MoGr blocks
1 batch per month

Validation at CERN
2 weeks

Coating at DTI
2 weeks

Validation at CERN
?

Assembly at CINEL
?

Validation at CERN

Possibility to measure uncoated blocks and samples

Possibility to measure coated blocks and samples

Possibility to measure collimator assembly

2 collimators per month starting January 2020
Baseline and questions concerning measurements

• Proposed baseline:
  1. We measure the uncoated *samples* before coating → check of MoGr bulk conductivity
  2. We measure the coated *samples* → check of coated MoGr conductivity
  3. **Probe** measurements on the full assembly collimator → check of non conformities (RF fingers)
     (with stringent limits on insertion and collimator gap)
     → risk minimized: - no pollution or damage to blocks, only to samples
        - less invasive check of collimator (probes only)

     → but: - no check of variability of production (MoGr and coated MoGr)
        - no check of difference between coating of samples and blocks
        - no check of resistive wall impedance of full assembly

• Questions:
  1. Should we measure a sampling of the uncoated **blocks**?
  2. Should we measure a sampling of the coated **blocks**?
  3. Should we push for **wire** measurements of the full assembly
Questions/options

1. Should we measure a sampling of the uncoated blocks?
   • Pros: we get an idea of the variability of conductivity of the bulk along the production and can check if there are differences with the sample. However, too many losses to be sensitive with the cavity measurement.
   • Cons: pollution, damage of the blocks and the systematic sigmatest measurements on every block should be enough.

   Proposal:
   - one should measure a subset of one batch with cavities (10), only if sample measurement is proven useful (which does not seem the case for now with the existing cavity).
   - In case of issues, only a subset should be used to check that the impact was or not coming from impedance.
   - Procedure should be checked by TE-VSC colleagues (done), and written up.
   - TE-VSC colleague should be present during the measurements of the blocks.

2. Should we measure a sampling of the coated blocks?
   • Pros: we can check the variability of conductivity of the final coated blocks along the production and if there are differences with the samples. It is the only method to do that.
   • Cons: pollution, damage of the blocks.

   Proposal:
   - one should only measure a subset of one batch with cavities (10), and then reassess the strategy after the measurements.
   - In case of issues, only a subset should be used to check that the impact was (or was not) coming from impedance.
   - Procedure should be checked by TE-VSC colleagues (done), and written up.
   - TE-VSC colleague should be present during the measurements of the blocks.

3. Should we push for wire measurements of the full assembly?
   • Pros: clearer identification of modes → better understanding of non conformities; access to resistive wall contribution if gap can be very small
   • Cons: large risk of pollution and coating damage by manipulation or wire breakage. Need for very small gap to measure the resistive wall impedance

   Proposal: no wire measurement (unless unexpected issues noticed with the probes).