



# SHIELDING WALL RECONFIGURATION - FLOOR FLATNESS ISSUE AND REWORK

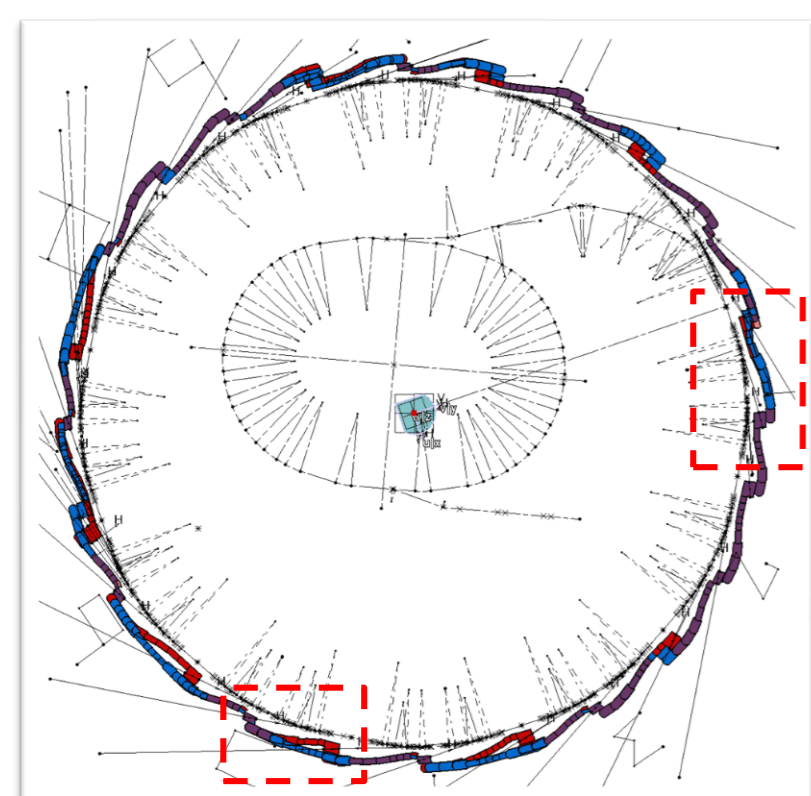
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Switching from Elettra to Elettra2.0, there will be a significant impact on the direction of a certain number of beamlines, due to the new 6 bending achromat lattice. For this reason, the storage ring shielding wall must be redesigned. The facility can rely on a shielding wall made of concrete blocks that guarantee maximum flexibility in terms of layout. This allows flexibility in terms of lightsources position and beamlines layout.

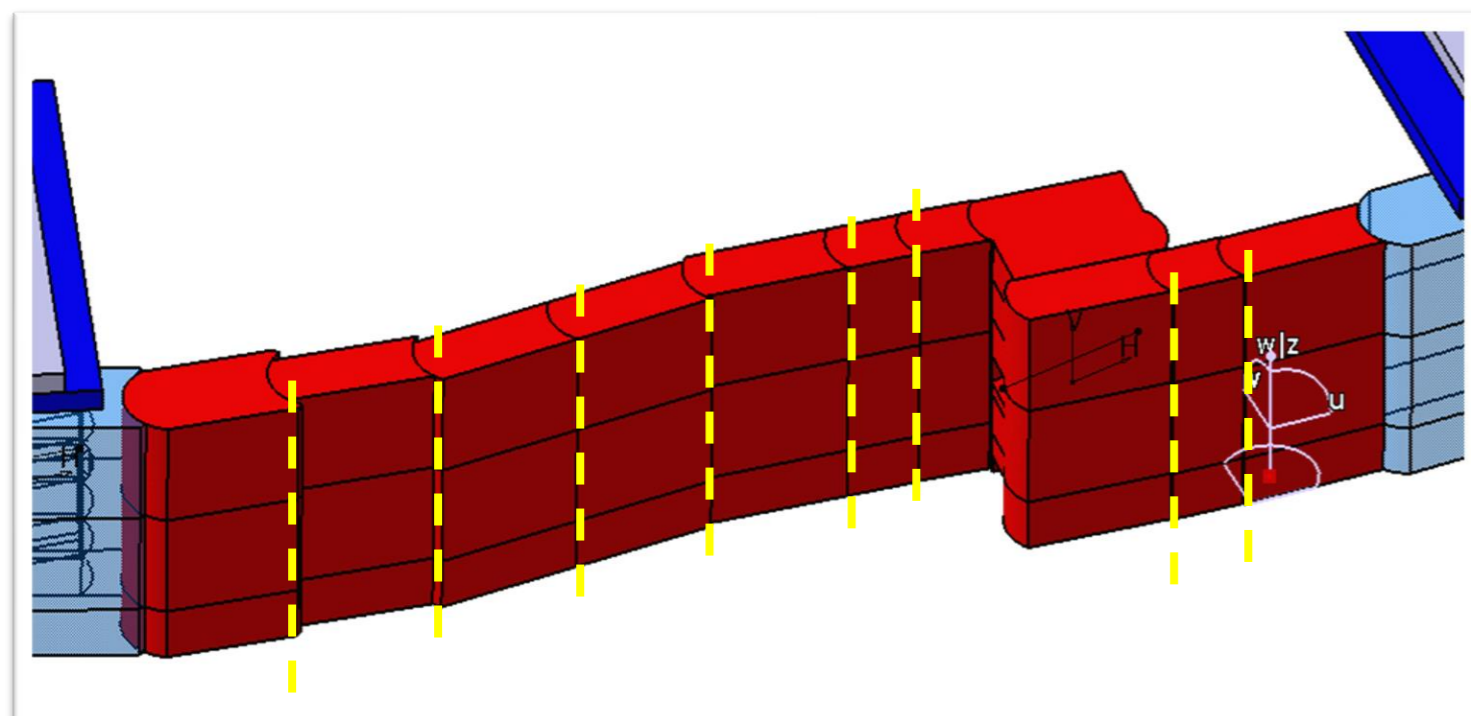
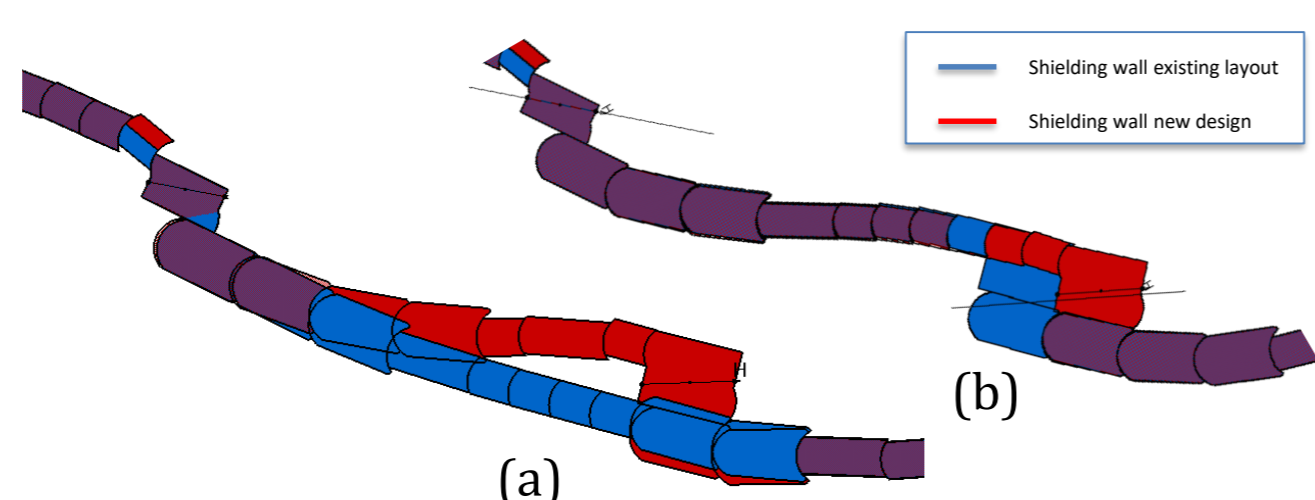
In order to meet the Elettra2.0 R&I scheduling, the shielding wall reconfiguration is already running during machine shutdowns and a part of the operations are expected to be over before the "dark period". The shielding wall reconfiguration is getting challenging due to some unexpected conditions of the experimental hall floor, in particular in terms of flatness. A countermeasure has been developed with the aim to guarantee the R&I scheduling and the efficacy of the shielding wall.

## 1. R&I scenario and issue



### SHIELDING WALL RECONFIGURATION

- Brand new beamlines (a)
- Small variations on existing layout (b)



### ISSUE

- Unexpected pitch and roll deviation between concrete blocks during the assembly of the new configuration of the shielding wall
- Operational slowdown
- Gap between blocks



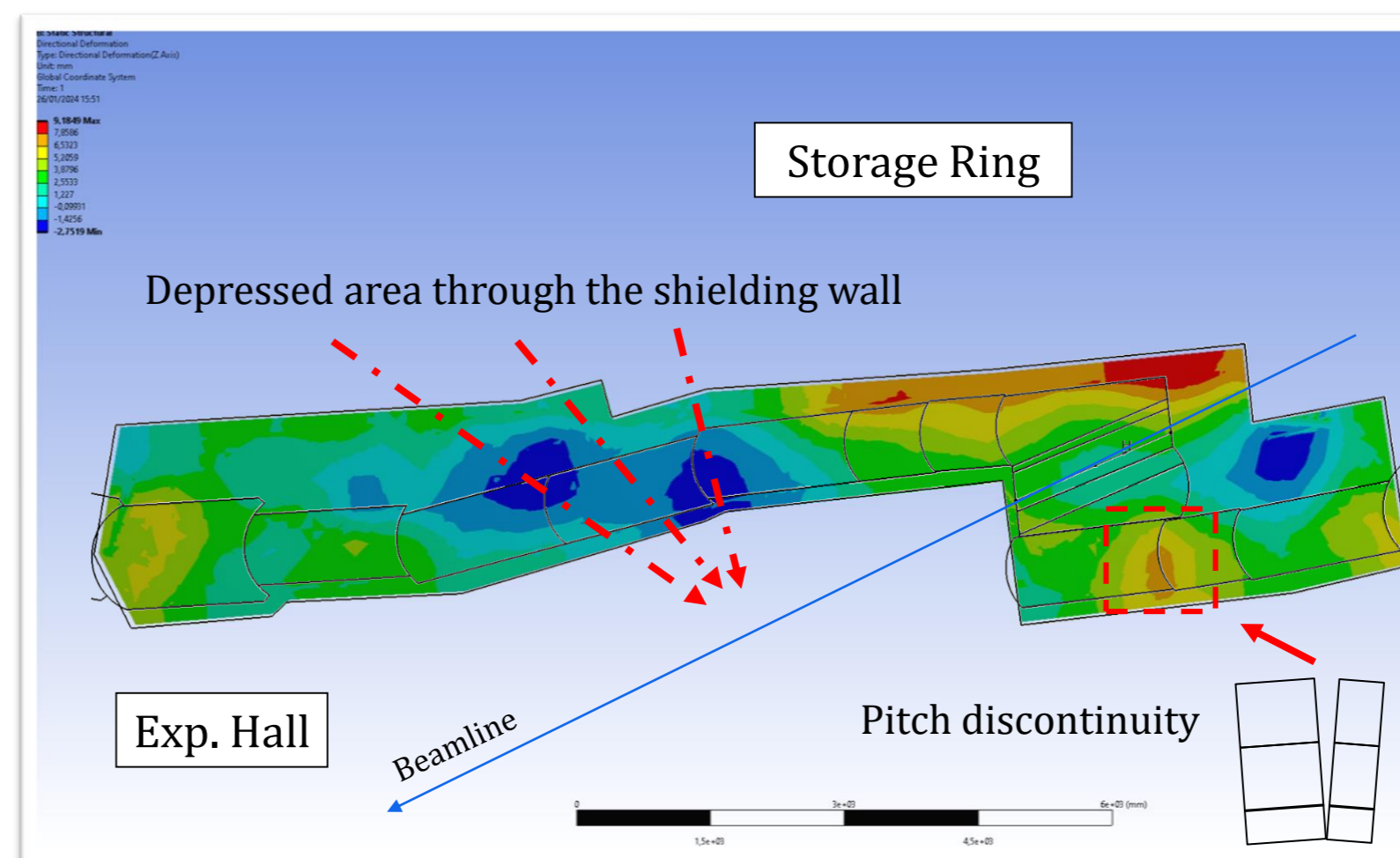
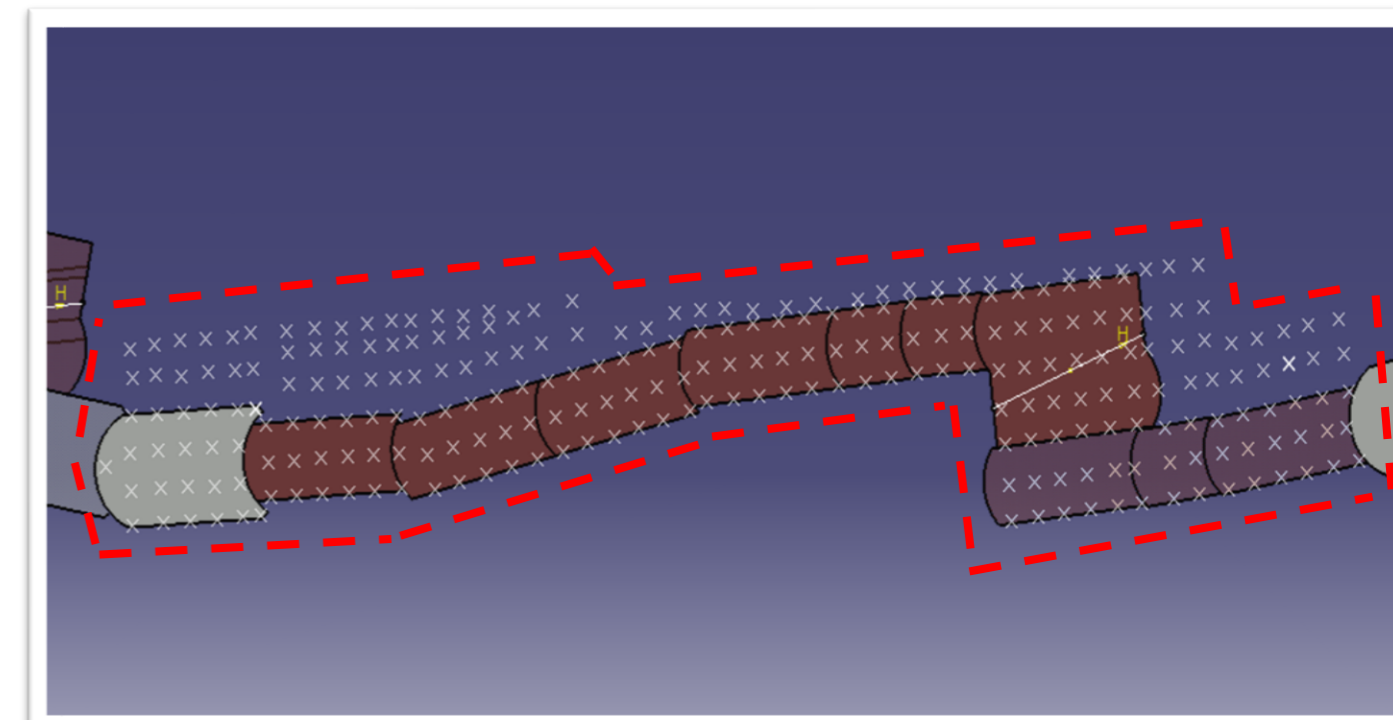
Elettra2.0 R&I scheduling



Shielding wall efficacy

## 2. Root cause analysis

- Concrete blocks inspection
- Pitch and roll analysis
- Off-line assembly tests
- Floor flatness first investigation
- Measurements grid development
- Floor flatness full analysis
- Laser-tracker displacement survey



### DISPLACEMENT SURVEY (vertical direction)

- $z_{min}$  [mm]: - 2.8
- $z_{max}$  [mm]: + 9.2
- Random discontinuity on the floor
- Depressed area through the wall
- Flatness under adjacent blocks up to 5mm

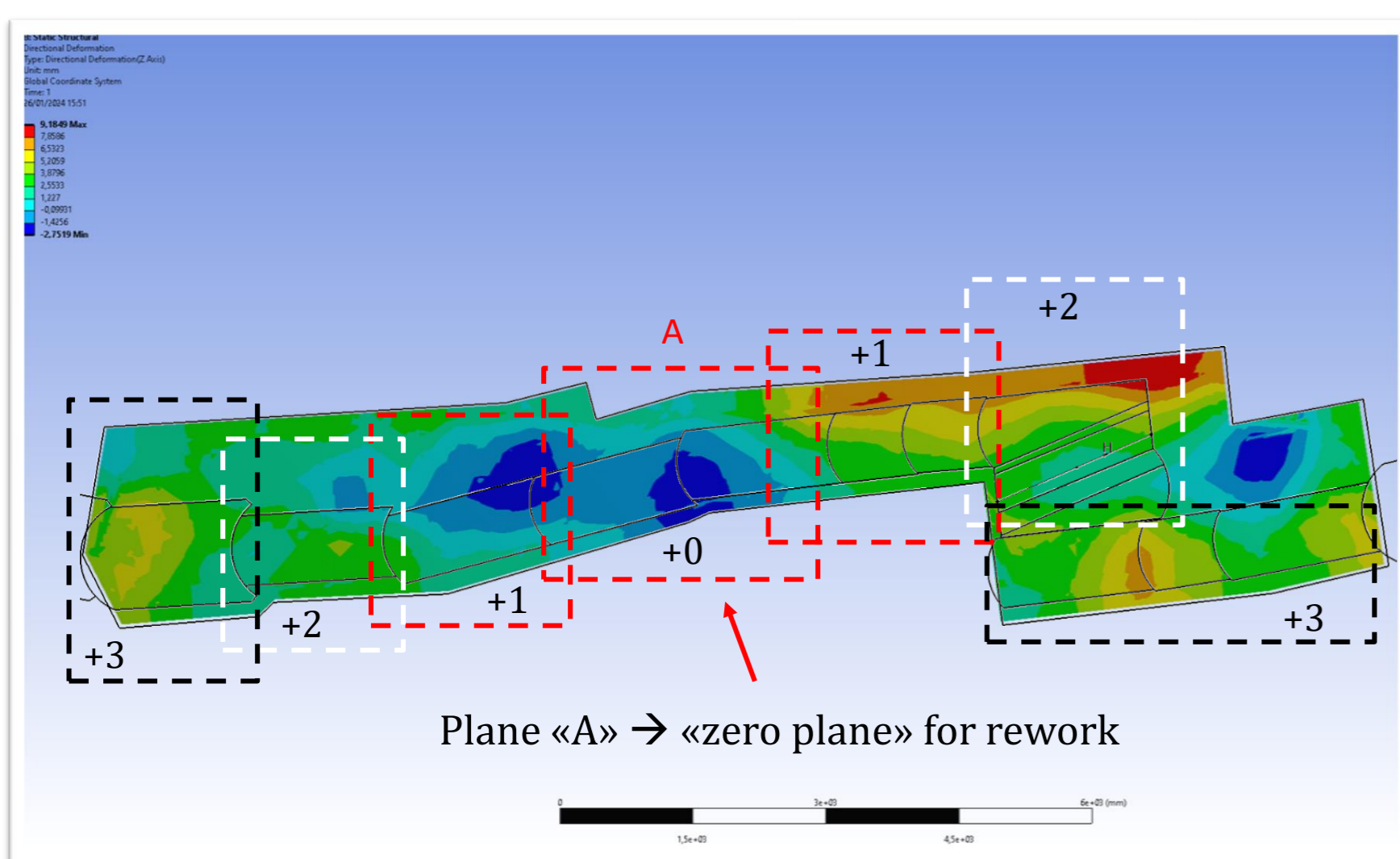
## 3. Countermeasure development

### TARGET

- Meet Elettra2.0 R&I time schedule
- Radioprotection efficacy
- Predictable pitch and roll of the concrete blocks

### SPECIFICATION

- No depressed areas of the floor through the shielding wall
- No flatness discontinuity
- Maximum flatness under adjacent blocks: 2mm



Plane «A» → «zero plane» for rework



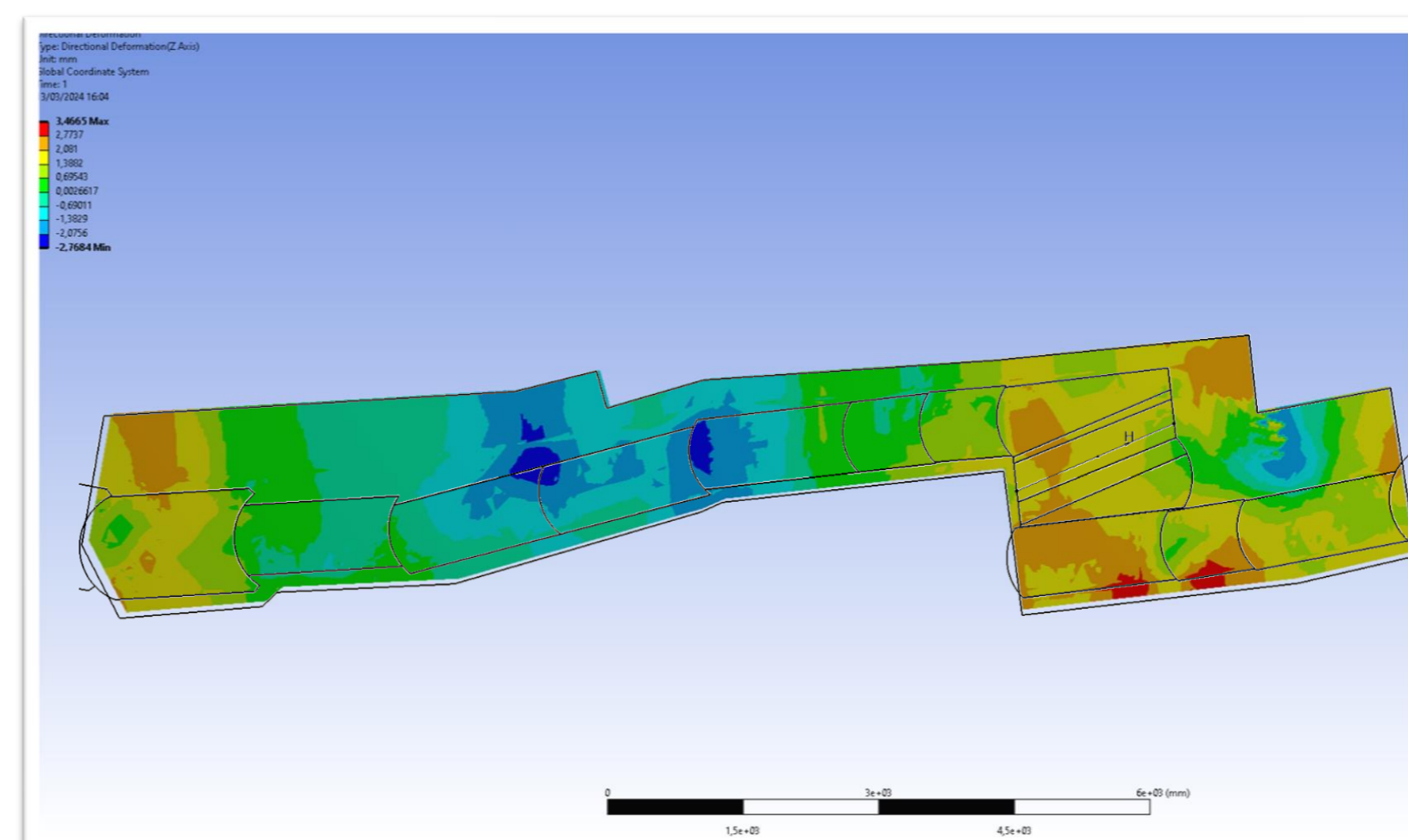
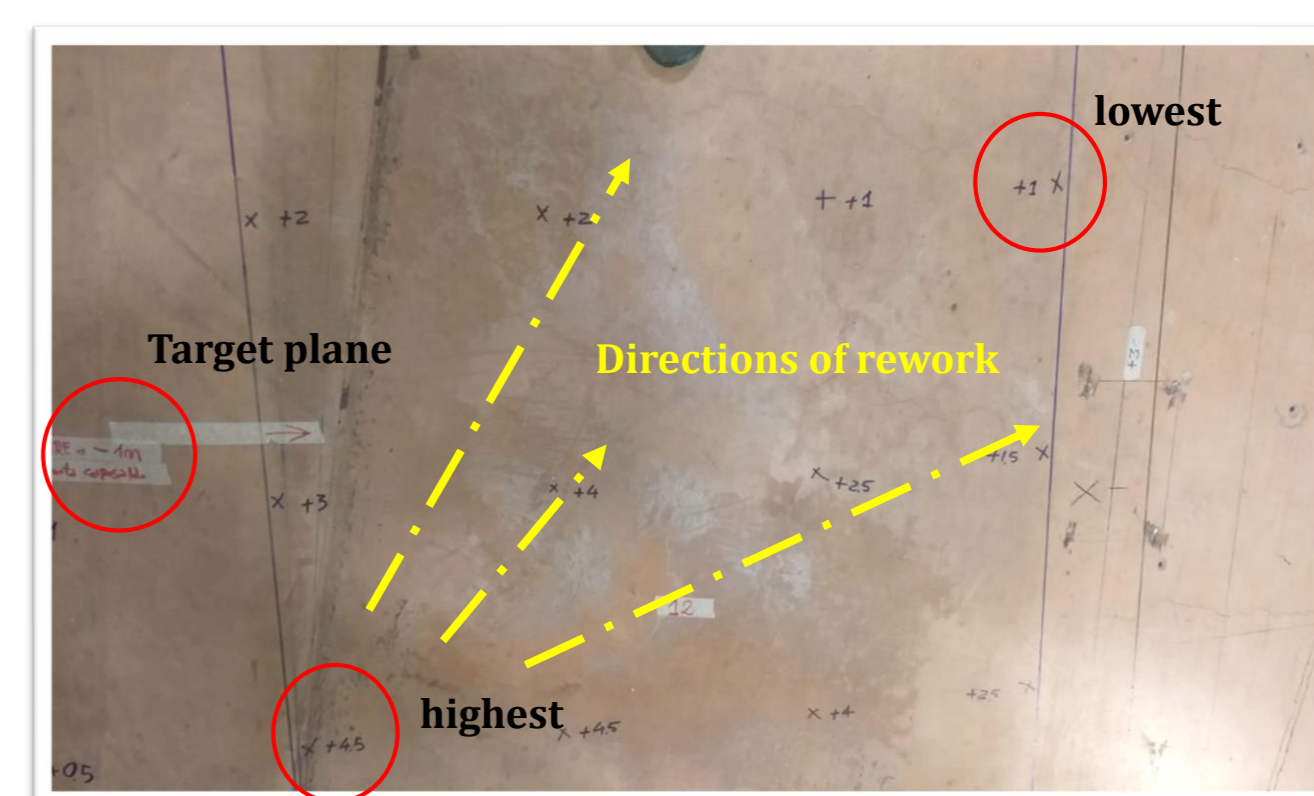
### REWORK HYPOTHESIS

- Reference plane «A» in correspondence with the lowest area
- Flatness discretization by ~1 mm step
- Concrete floor bush hammering and polishing

## 4. Rework and final measurements

### WORK INSTRUCTION

- Target planes
- Rework areas
- Map of local displacements to be removed (directly marked on the floor)
- Rework directions
- Rework monitoring



### DISPLACEMENT FINAL SURVEY

- $z_{min}$  [mm]: - 2.8
- $z_{max}$  [mm]: + 3.5
- 50% flatness reduction
- Flatness under adjacent blocks: 2 mm
- Rework process validation
- Final shielding wall reconfiguration without issues during assembly

## Conclusions

The results of the rework carried out, showed that the condition of the floor in terms of flatness is fundamental in order to achieve a correct assembly of the concrete blocks and guarantee the efficacy of the shielding wall. A correct assembly is also matter of safety, last but not list respect of project timeframe.

The rework process, validated on two different shielding wall reconfigurations, represents a powerful tool for the future R&I activities. Next step will be to schedule floor displacement surveys through the whole Experimental Hall, with the aim to predict as much as possible rework activities, if needed. As a matter of fact, a significant amount of shielding wall reconfigurations can be performed only during the "dark period", the survey will help to avoid unexpected events that could compromise the project timeplan.

## Acknowledgment

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