



GIRDERS BASES AND BASEPLATES – TOWARDS FAST&EASY INSTALLATION

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The Elettra 2.0 storage ring will be positioned on 168 granite girders. But these blocks represent only the top part of the support system. Underlying them, there is the need of a stable support that will connect the girders to the concrete foundation. These supports needs to: 1) ensure stability, 2) be sufficiently precise, 3) be capable of fast positioning and alignment with 4) minimum crane usage. The last point is critical to ensure a fast deployment without bottlenecking the already challenging schedule.

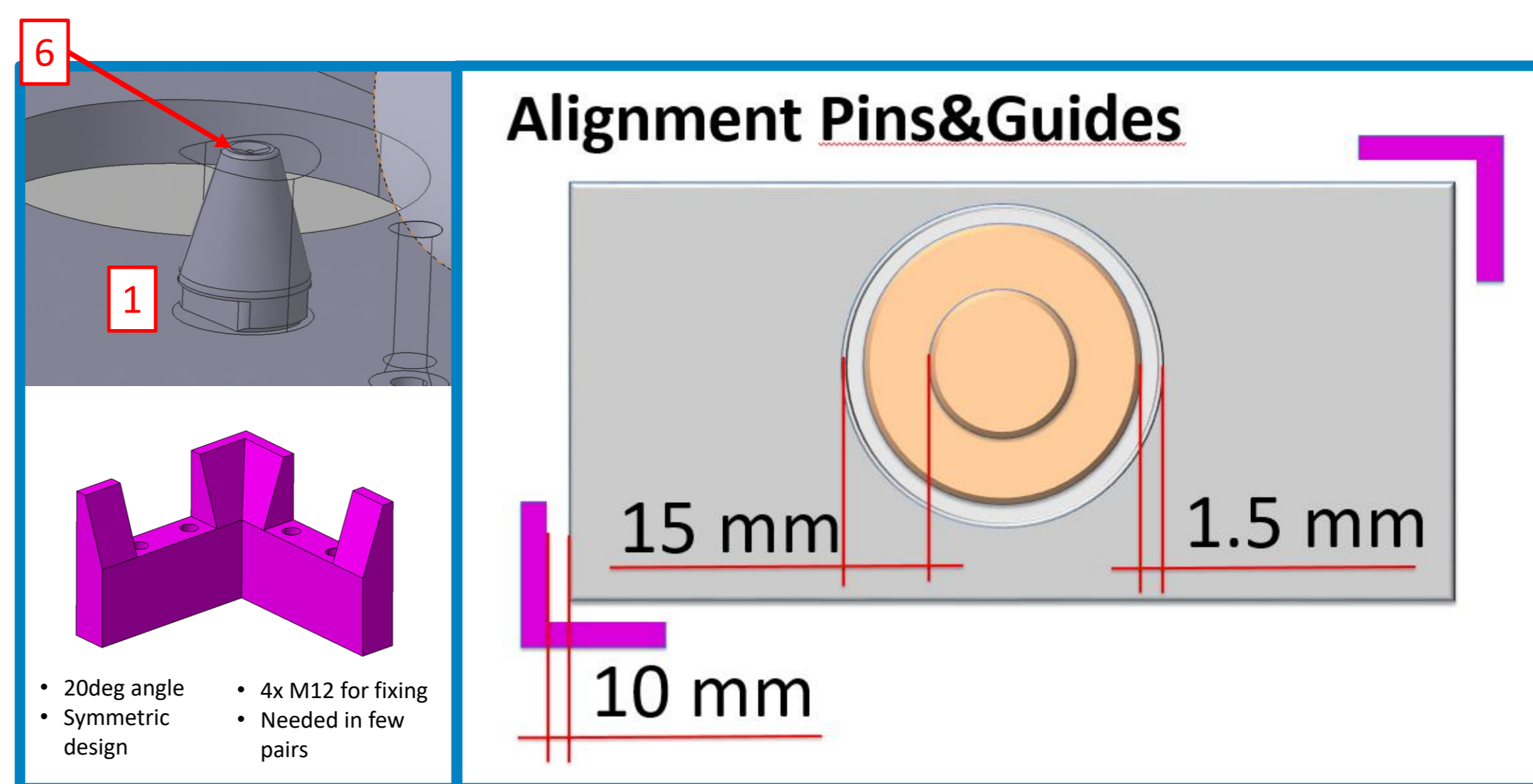
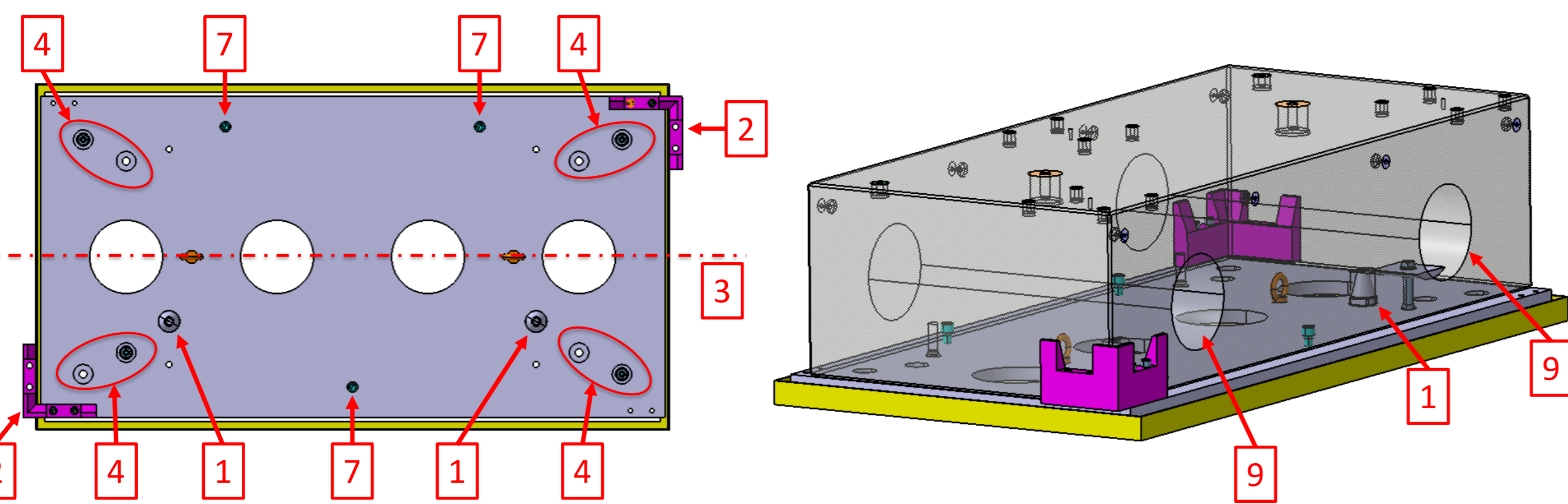
The proposed solution achieves the objectives with a two-piece approach: a steel plate is grouted to the concrete foundation, with a granite machined block bolted on top, serving as the stable interface for the girders above. The lighter plate does not require the overhead crane usage for its alignment, allowing for a faster operation. The granite block allows for very good dimension tolerances and can be fabricated in advance. Thanks to a pair of bespoke conical centering pins designed in the plate, the alignment of the granite block is directly derived from the alignment of the plate, without requiring any further operation. A set of external guides fixed to the base plate help the crane operator in engaging the centering pins without direct line of sight. The detailed procedure starting from the bare concrete tunnel to the fully assembled girders is also detailed, following the process from start to finish.

Challenge:

- 168 base blocks for as many girders
- Only two overhead cranes for all the Ring
- A tight schedule

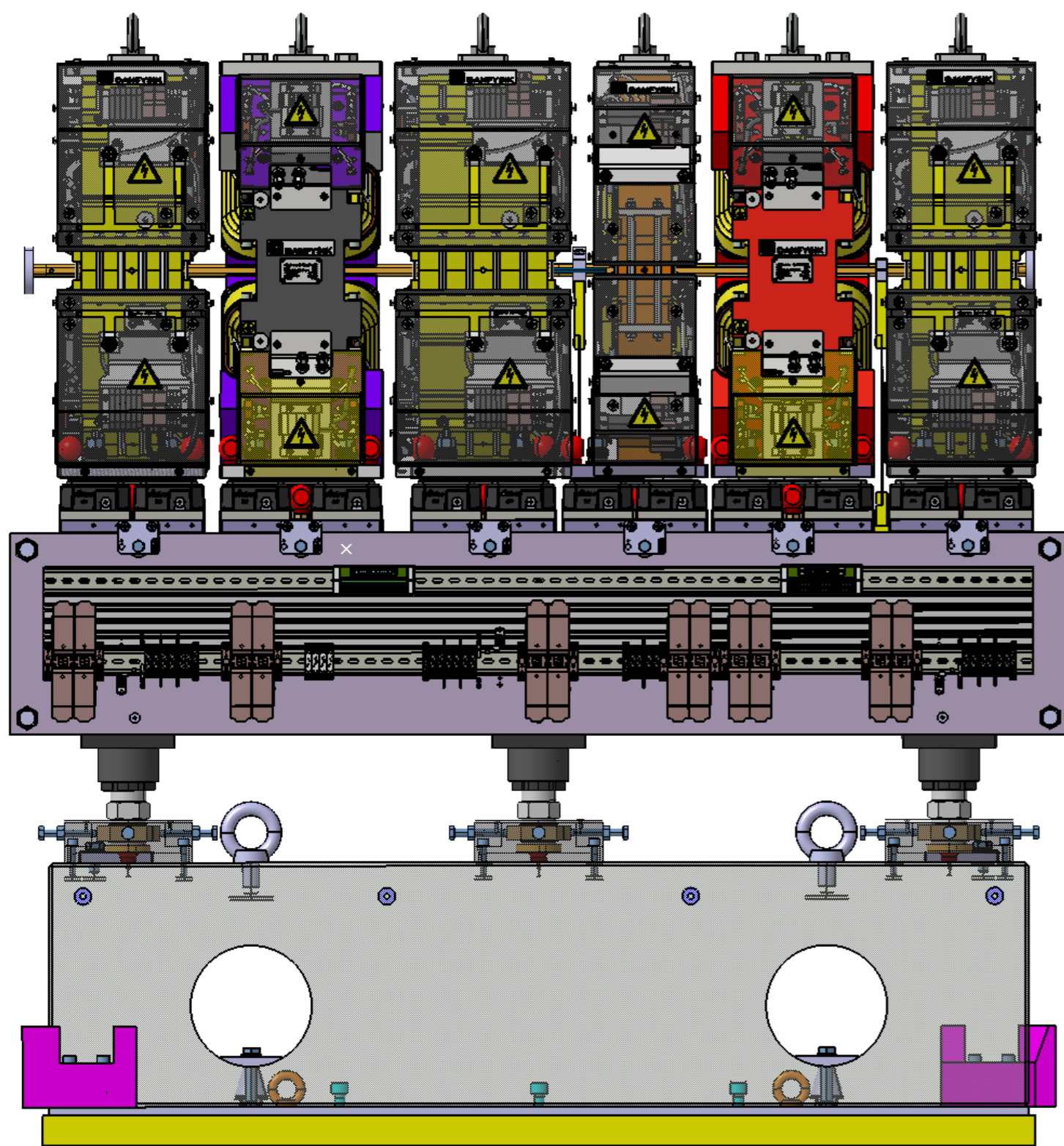
Solution:

- Aim as much for no-crane operations &
- Streamline those that need it



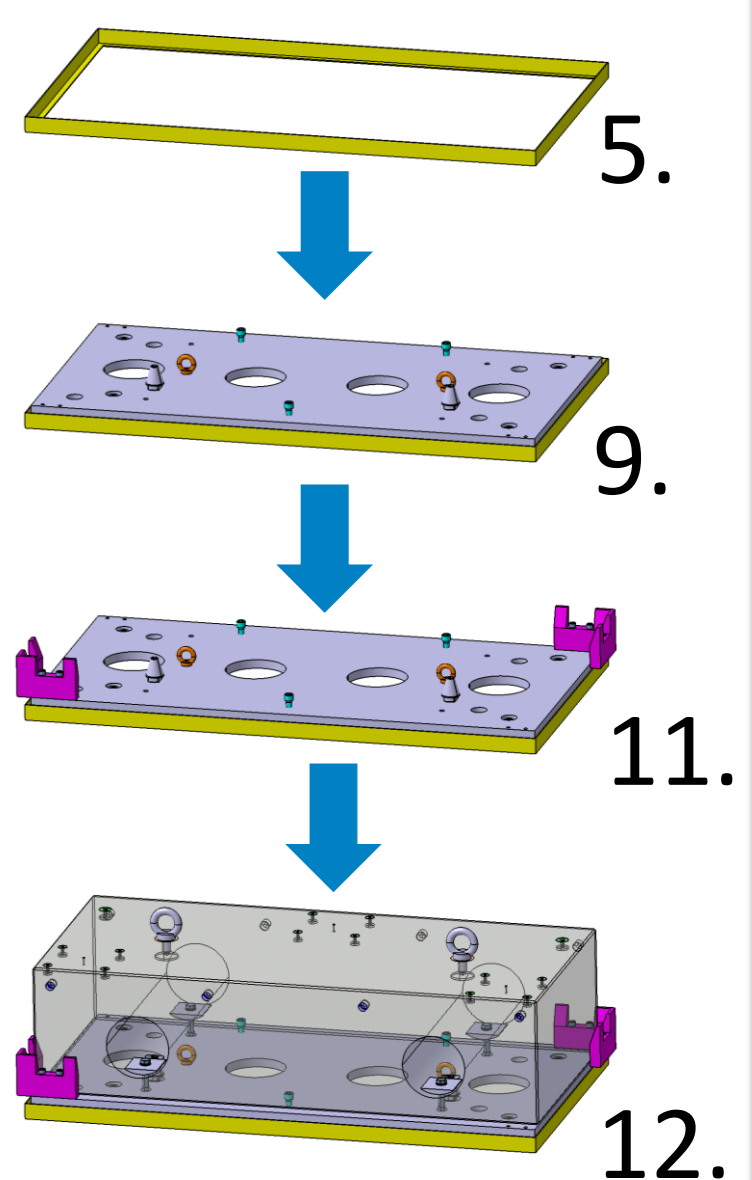
Feature Set

1. Self centering bespoke conical alignment pins
2. External Guides for engaging pins without line of sight
3. Asymmetric design forcing correct orientation
4. Staggered and duplicated anchor holes for redundancy
5. Four (4) holes for grouting mix pouring and control
6. Integrated conical cradles for alignment reflectors
7. Three (3) levelling screws
8. 2x M12 Lifting Eyebolts (p), 2xM16 (b)
9. Bored through holes for piping and cabling



Installation Procedure

1. Concrete foundation pouring and hardening
2. Foundation painting
3. Plate position & anchors tracing → PC jig
4. Drilling of anchors
5. Grouting frames laying & prep of plates
6. Plates transportation in tunnel
7. Plates alignment: positioning and levelling
8. Anchors pre-tightening
9. Grouting mix pouring and setting
10. Levelling screws removal and final tightening
11. Installation of external guides
12. Granite base installation
13. External guides removal and proceed to next



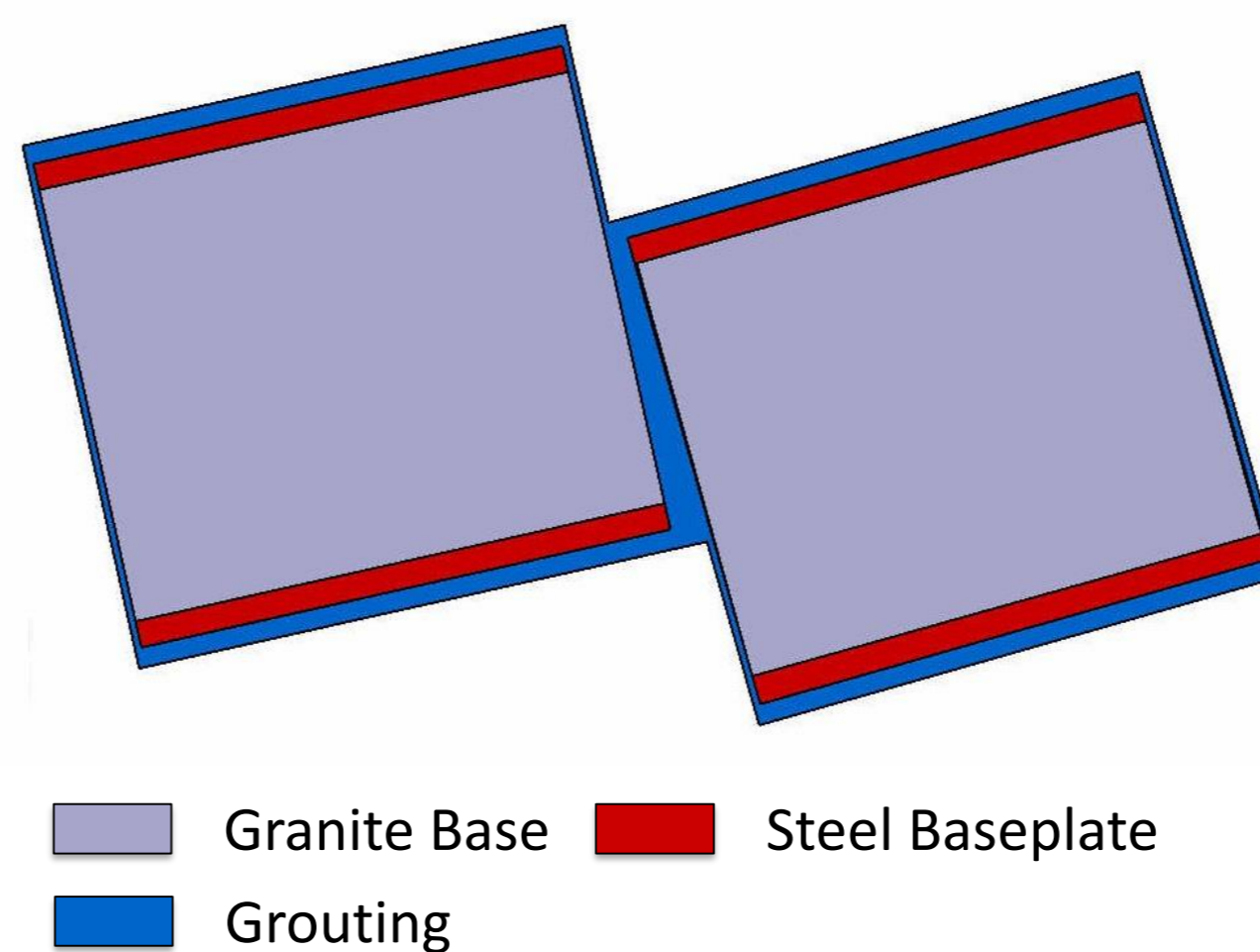
- Two achromat at a time -

Queen-Sized Grouting

Some areas have the girder placement too close for the normal grouting procedures.

In these areas a special grouting covering two plates will be poured.

The “wedded” plates will be always for a short multipole magnet girder and a dipole bending magnet.



Granite Base
 Steel Baseplate
 Grouting

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