Handling Discussions

LAGUNA-LBNO/Layout Study Group - Friday 19/7/2013

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Introduction

- These slides follow up initial discussions of handling with Ilias.

- Ilias' proposal: target and horn to be installed in 18% slope tunnel

Some Recommendations for Remote Handling (ITER) – of interest at concept stage

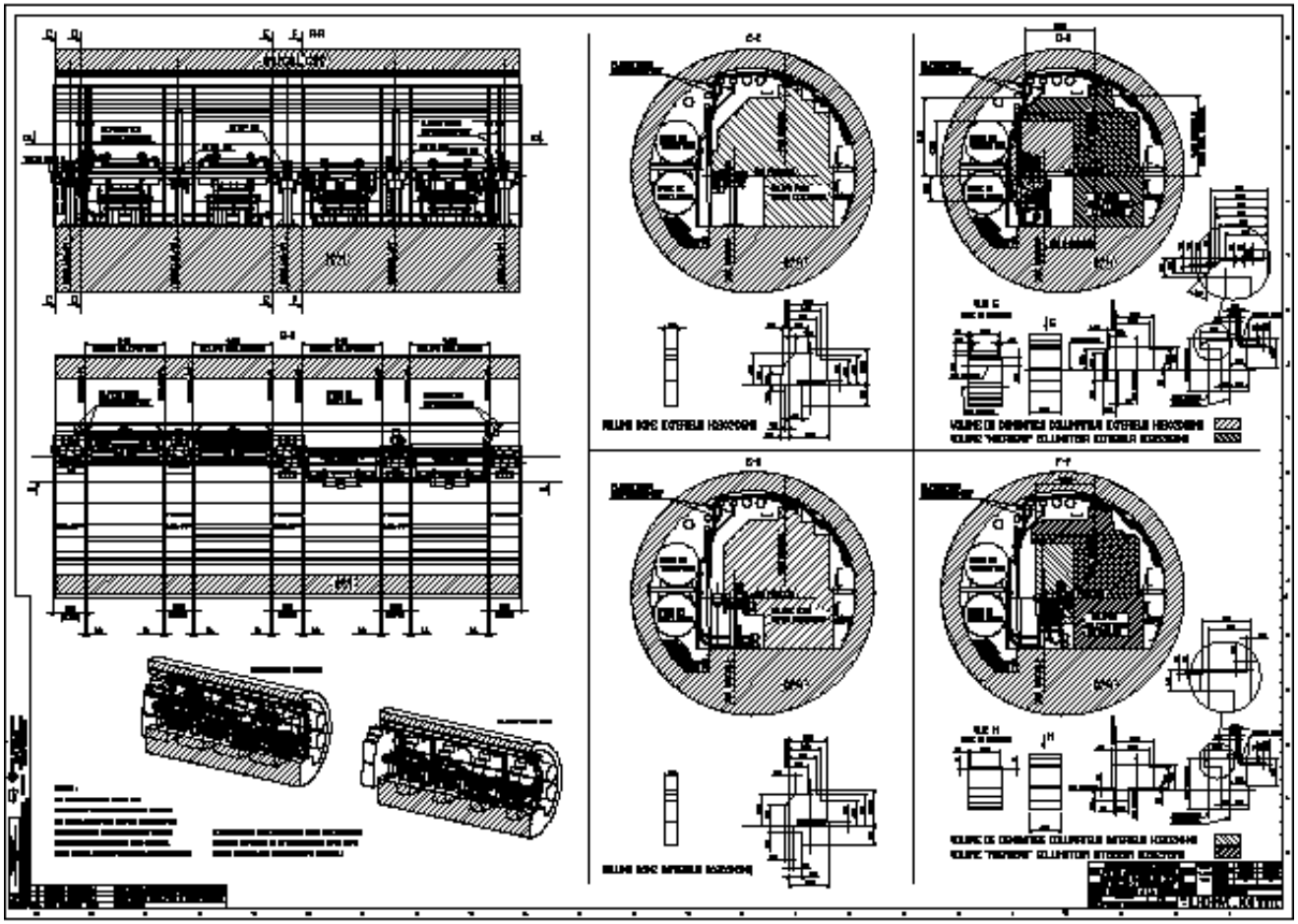
- Consider RH compatibility from earliest stage of development cycle
- Prefer **vertical** load transfer during installation and removal
- Use of a crane provides compliance in 5 d.o.f. (helps self alignment)
- Provide for self alignment (into position and with handling equipment) – typically use of cones
- Keep operations simple
- Recovery techniques vital

- Provide space for handling trajectories and for vision
- Provide visual clues for gross alignment motions
- Protect sensitive equipment

LHC Collimators: First mock up tests

Dummy collimator installed on base using modified truck loader crane fitted with hoist and spreader rotation. Operation with camera viewing and remote control

Reserved space for collimator handling LHCHMUMC_0001



Implications for infrastructure

Implications for collimator dimensions

It was necessary to modify water pipes

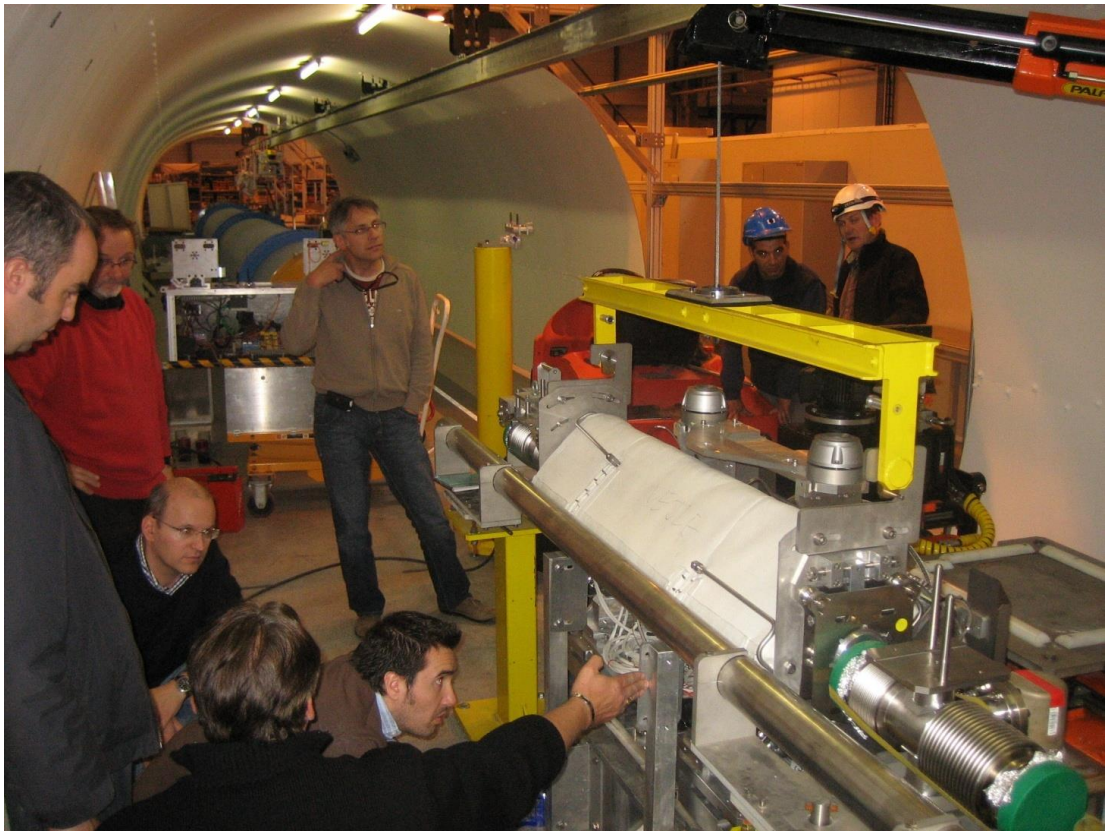
Plug – ins:

Careful guidance during LHC installation

Plug-in behaviour tests 2010

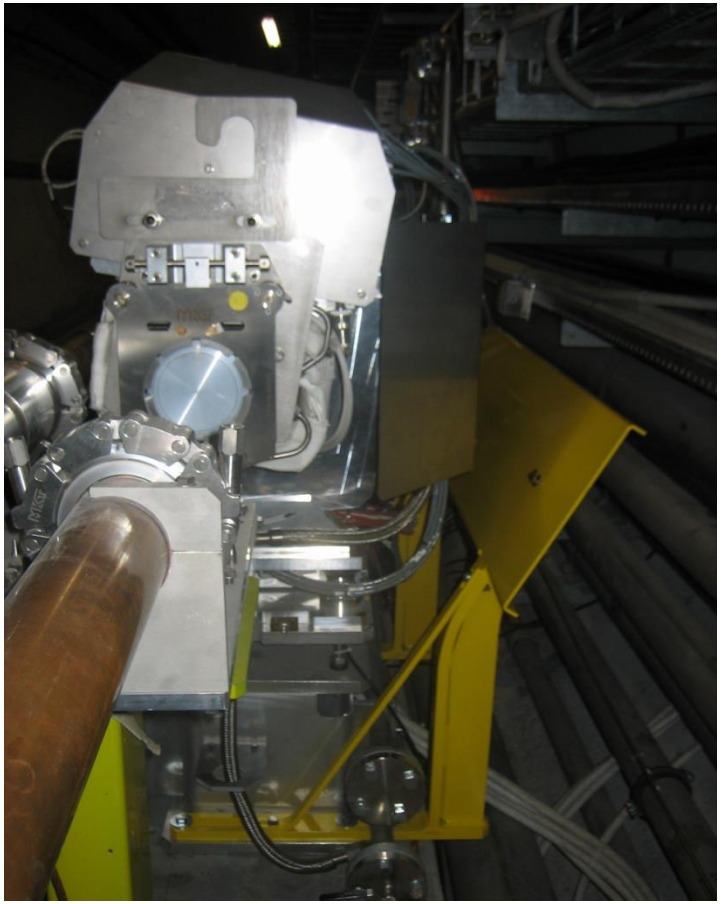
Practical Investigations in mock-up by EN-STI,

EN-MME and EN-HE.



Cryoline protection

At end of crane boom

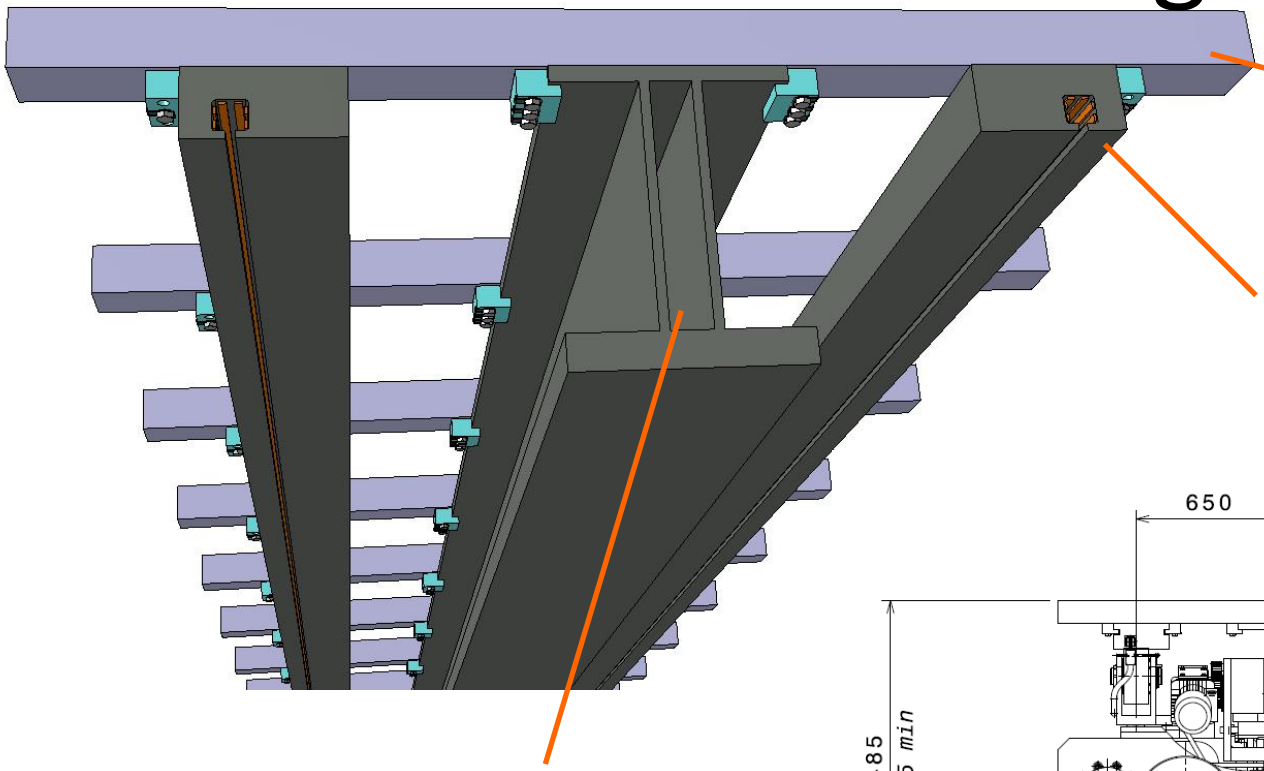


Behind collimator

Remote collimator handling crane

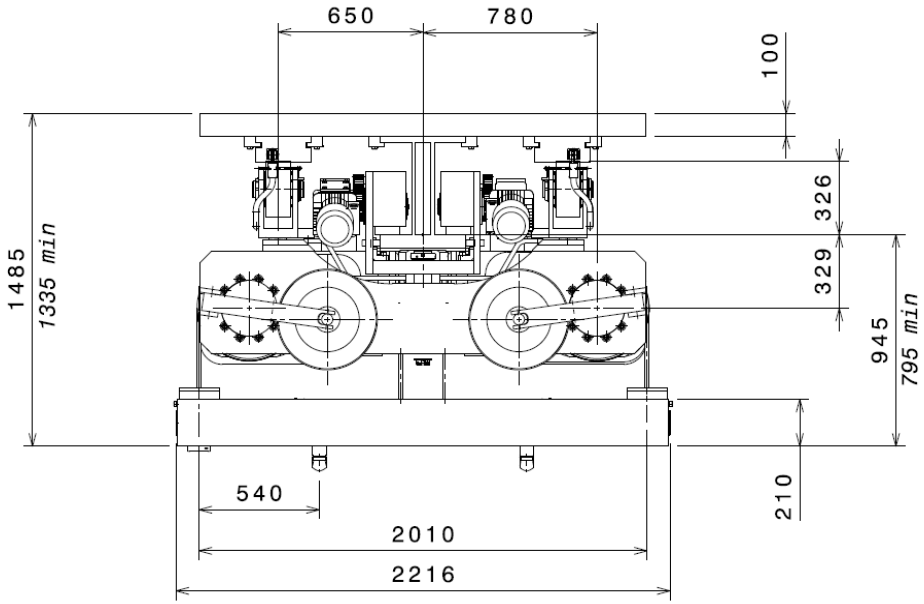
ITER Monorail Crane
(Neutral beam remote handling system)

Monorail Design



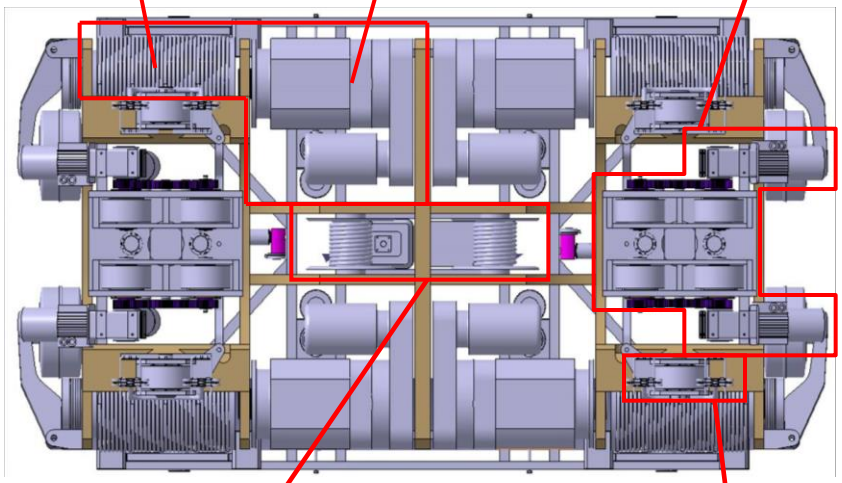
Cross-beams

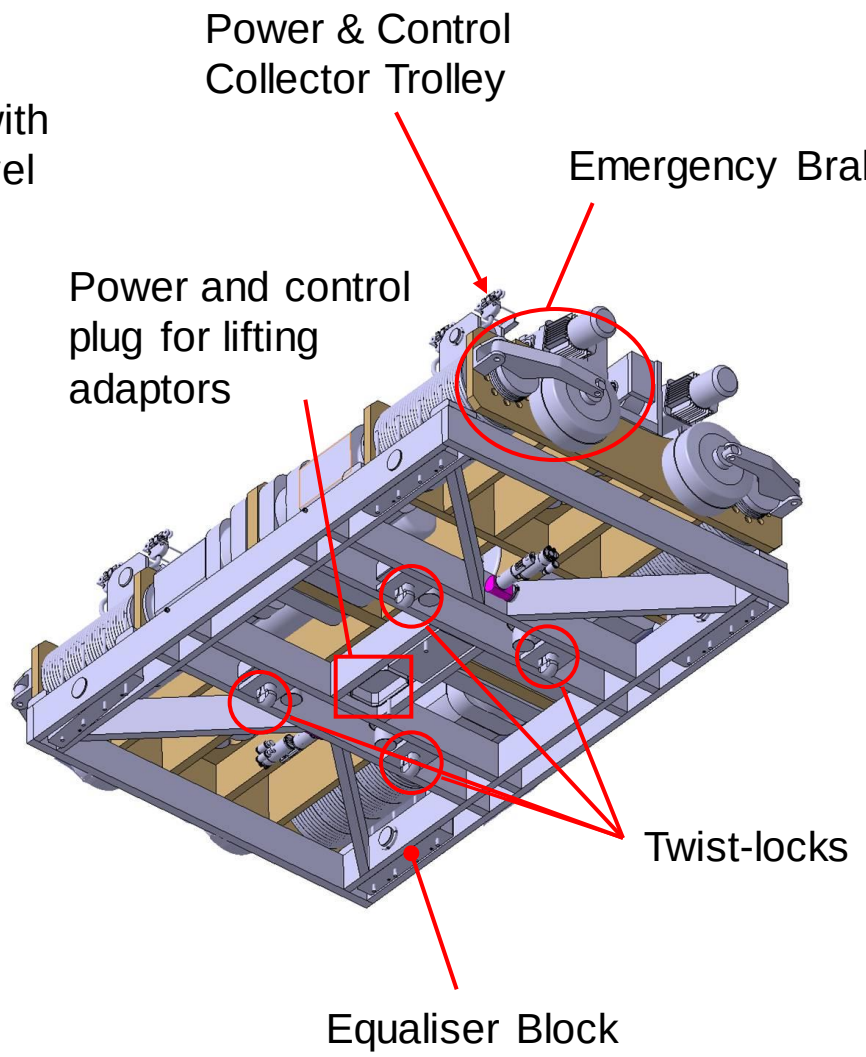
Stabiliser rails react eccentric loads
Rails contain bus bar power connection lines



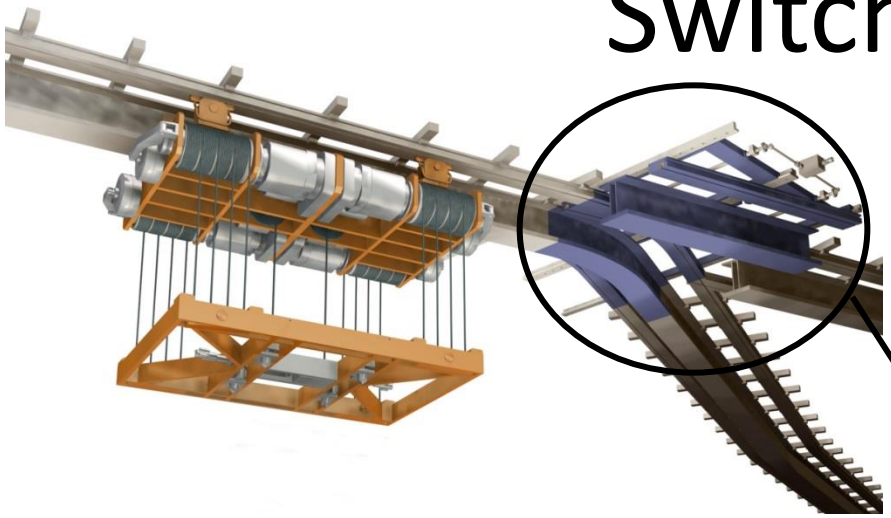
Central I beam rail has been developed to have a wider hollow vertical section to resist the torsion introduced in eccentric load conditions

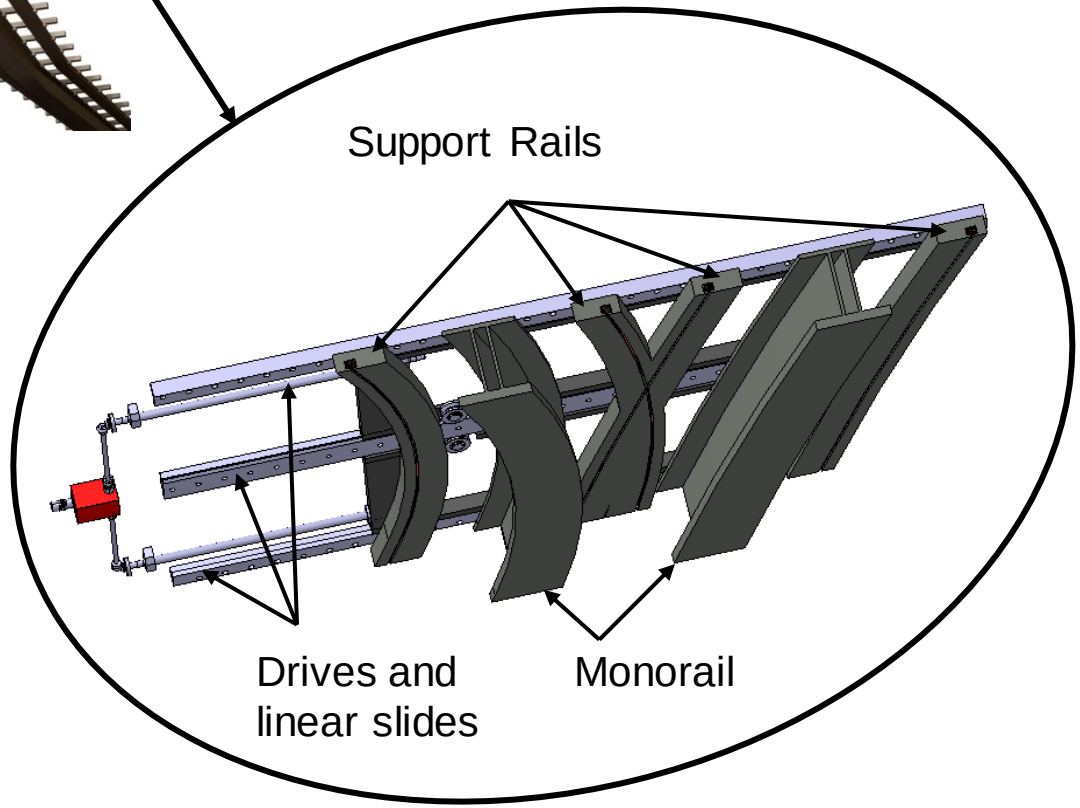
Design Layout



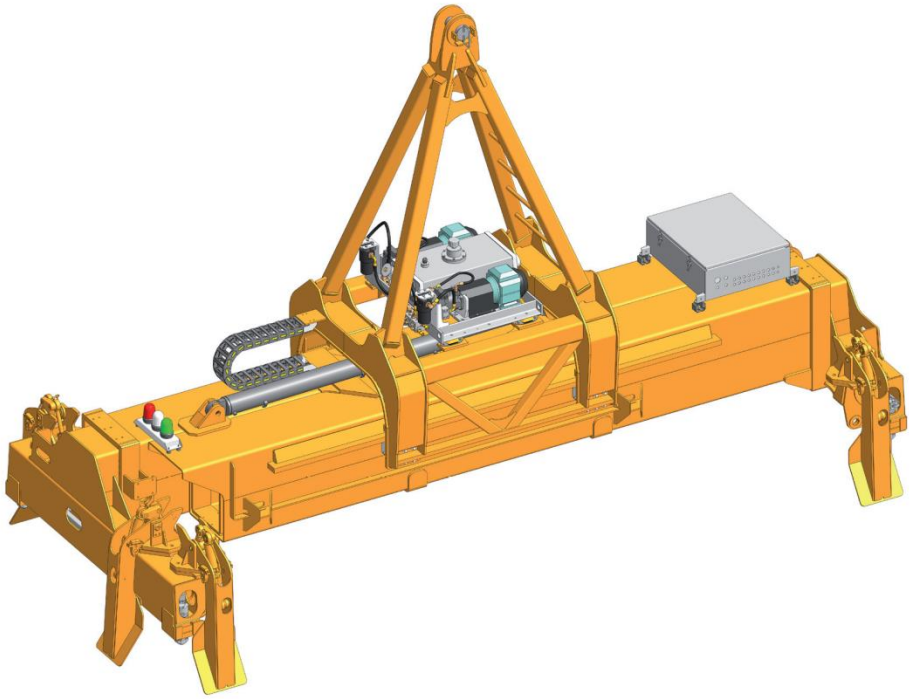


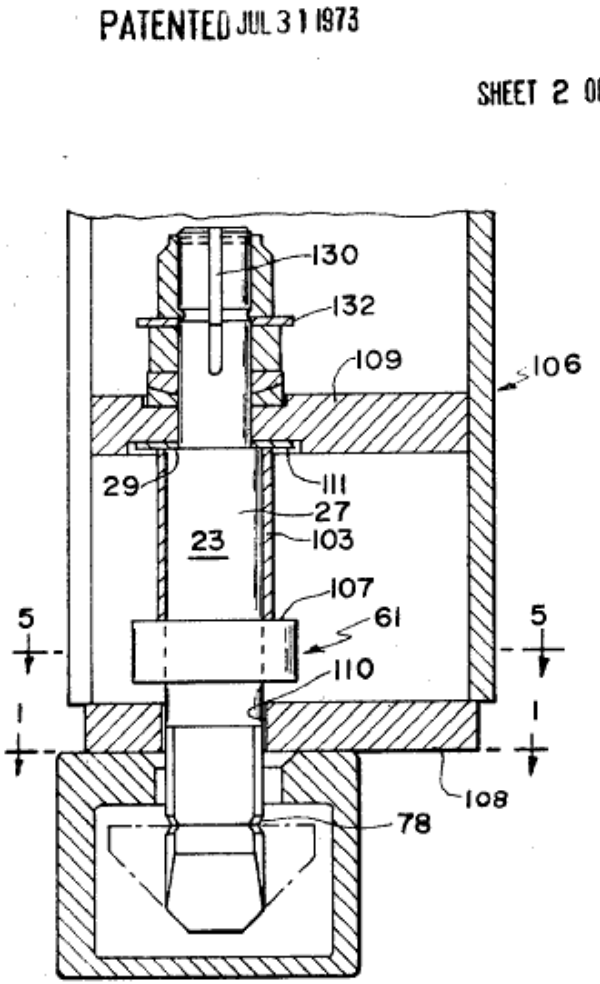
Switch System





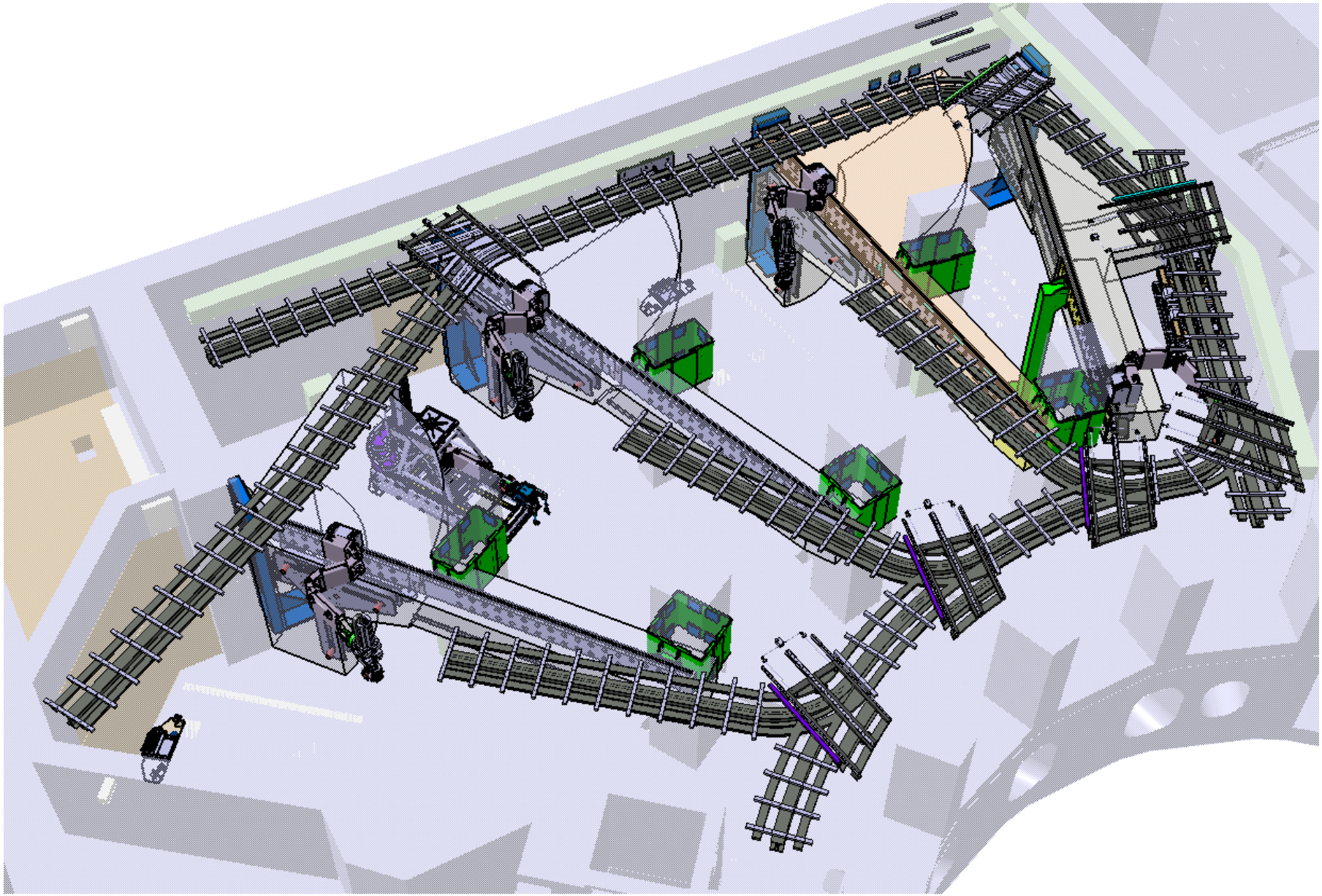
Twist locks



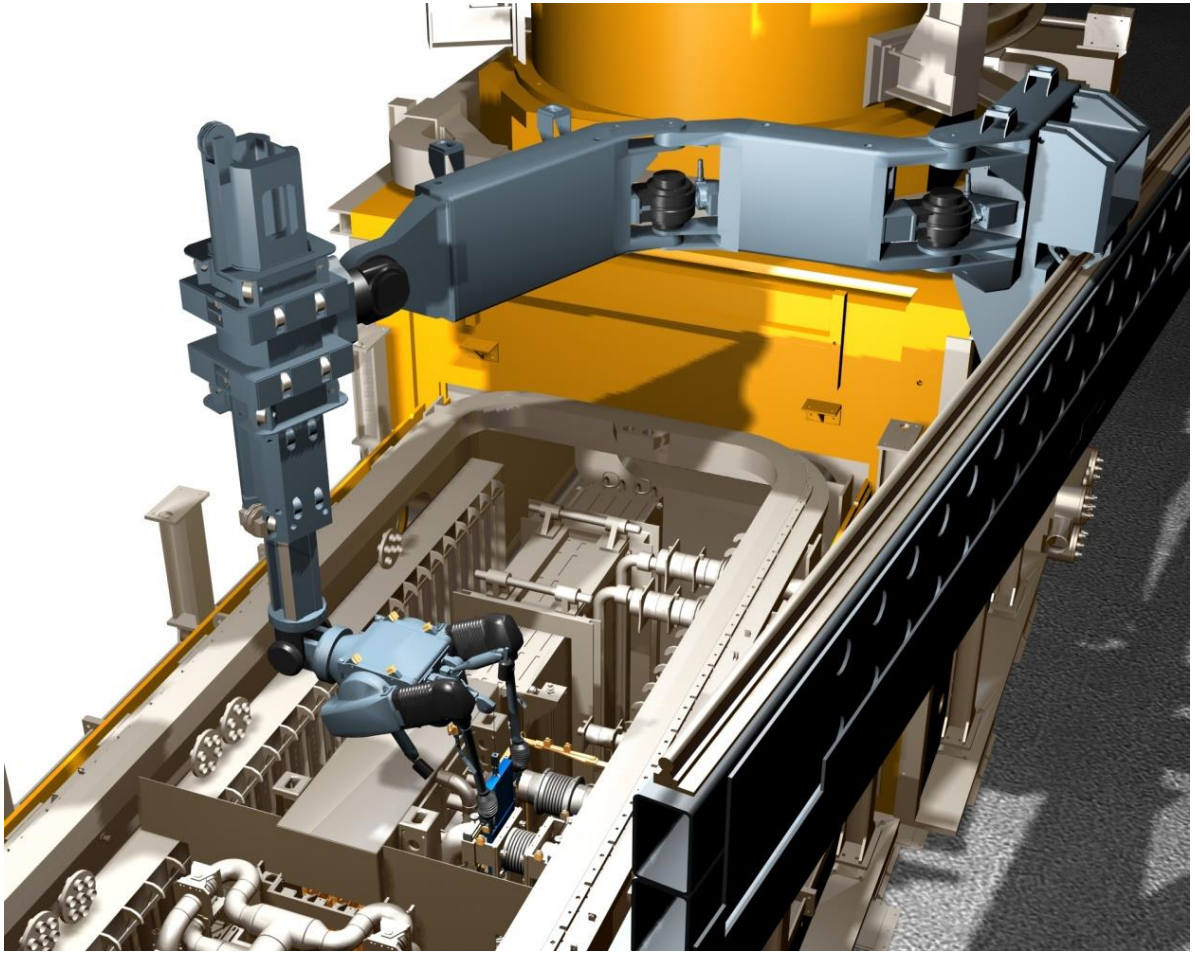


Any questions?

EXTRA SLIDES



ITER Remote Handling
Beam Line Transporter



SOME IMPLICATIONS OF TRANSPORT AND INSTALLATION ON COLLIMATOR AND INFRASTRUCTURE DESIGN

- **Lift points**
  - Adjustable and blocked for C of G
- **Dimensions**
  - Respect transport zone when installed (covers to manage cables and hoses)
  - Respect Space next to other beam pipe and infrastructure
- **Plug-ins**
  - Compatible with vertical lowering when collimator suspended from single support point
- **Vacuum**
  - Clearance when lowering on pins (+ remote disconnection…)
- **Infrastructure**
  - Respect space required for handling (see LHCHMUMC_0001)