
# Proposal of a dummy septum to mitigate ring irradiation for the CERN PS Multi-Turn Extraction

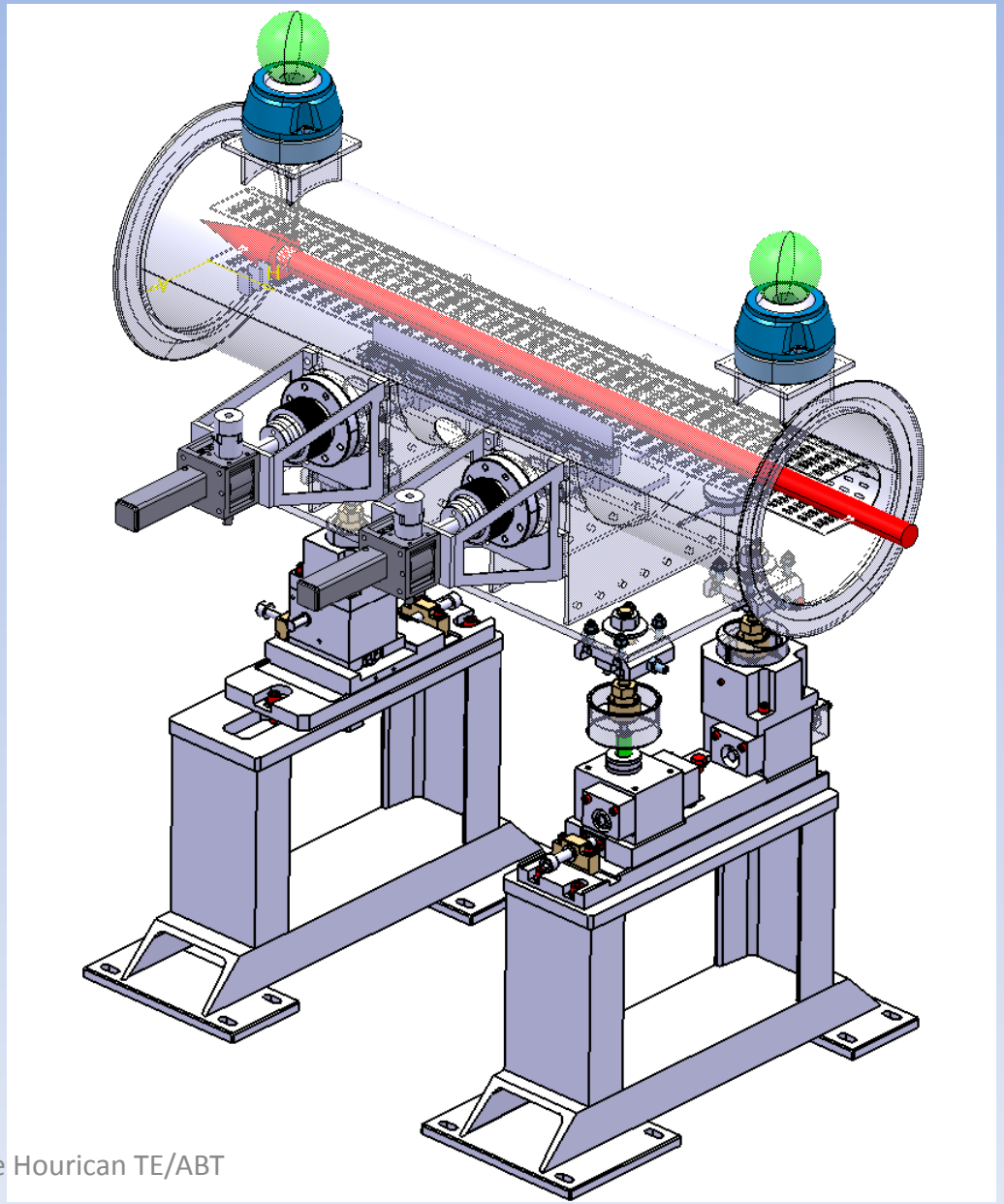
....High-activation of the extraction magnetic septum of the CERN PS machine was observed due to the losses of the continuous beam extracted via the Multi-Turn Extraction (MTE) method. The resulting activation is however incompatible with safe operation so a mitigation measure had to be found : the installation of a dummy septum to shield the actual one seems to provide the required reduction in activation in the extraction area. The dummy septum should, in fact, absorb the particles during the rise time of the MTE extraction kickers, reducing the impacts on the thick blade of the magnetic extraction septum. The principle of the proposed modifications of the PS layout will be presented together with the studies aimed at finalising the new configuration.

# Initial Proposal

The new dummy septum, 40 cm long, 3.88 cm high and 3 mm thick blade inside the beam tube.
Tungsten

The wall thickness of the tube is 3 mm, and the material is stainless steel 316 LN.

Current Proposition (Mike)
Diameter  254/250mm (Wall thickness 2mm)
This is standard tube but can be rolled if necessary with thicker walls

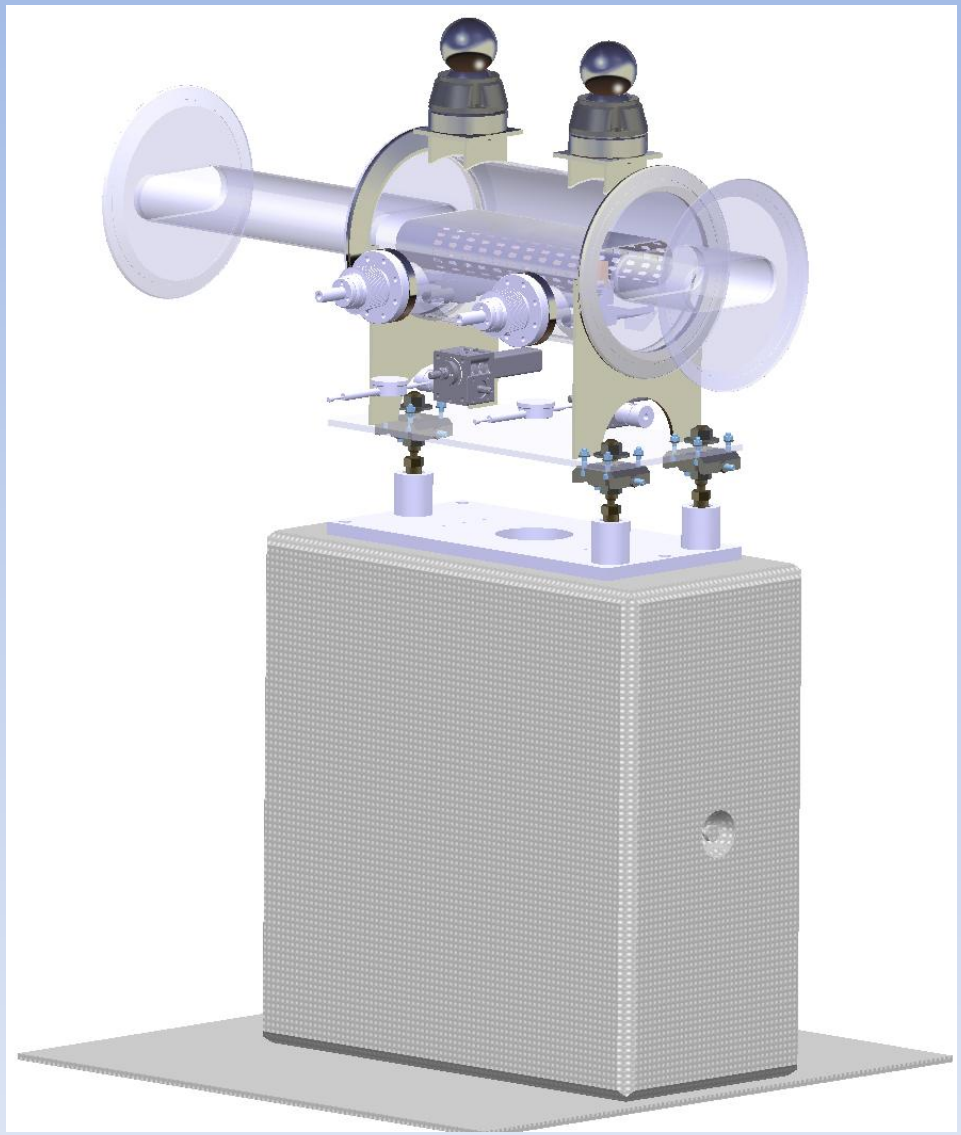


# Tunnel Installation

Complete straight section shall be transported to PS and installed on the pre-aligned support.

Easy and reproducible after initial alignment in tunnel

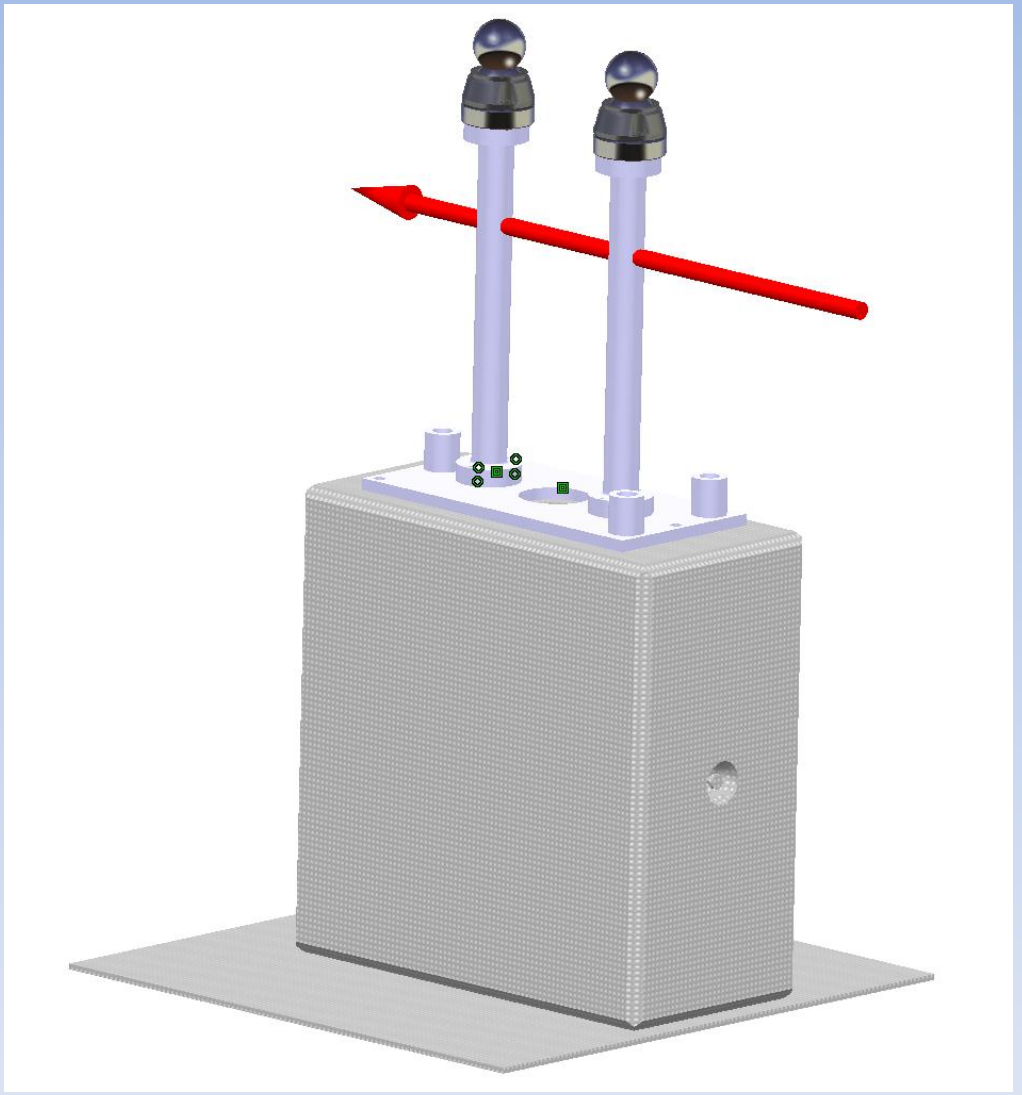
Self centering feet allows for modular rapid replacement



# Installation - Latest Proposition

Install and align (Approximately) the standard size concrete block which serves as both shielding and support structure for the dummy 15.

Machined plate fixed to block and alignment targets adapted to the PS beam height and axis.



# Assembly of the Dummy 15 Tank

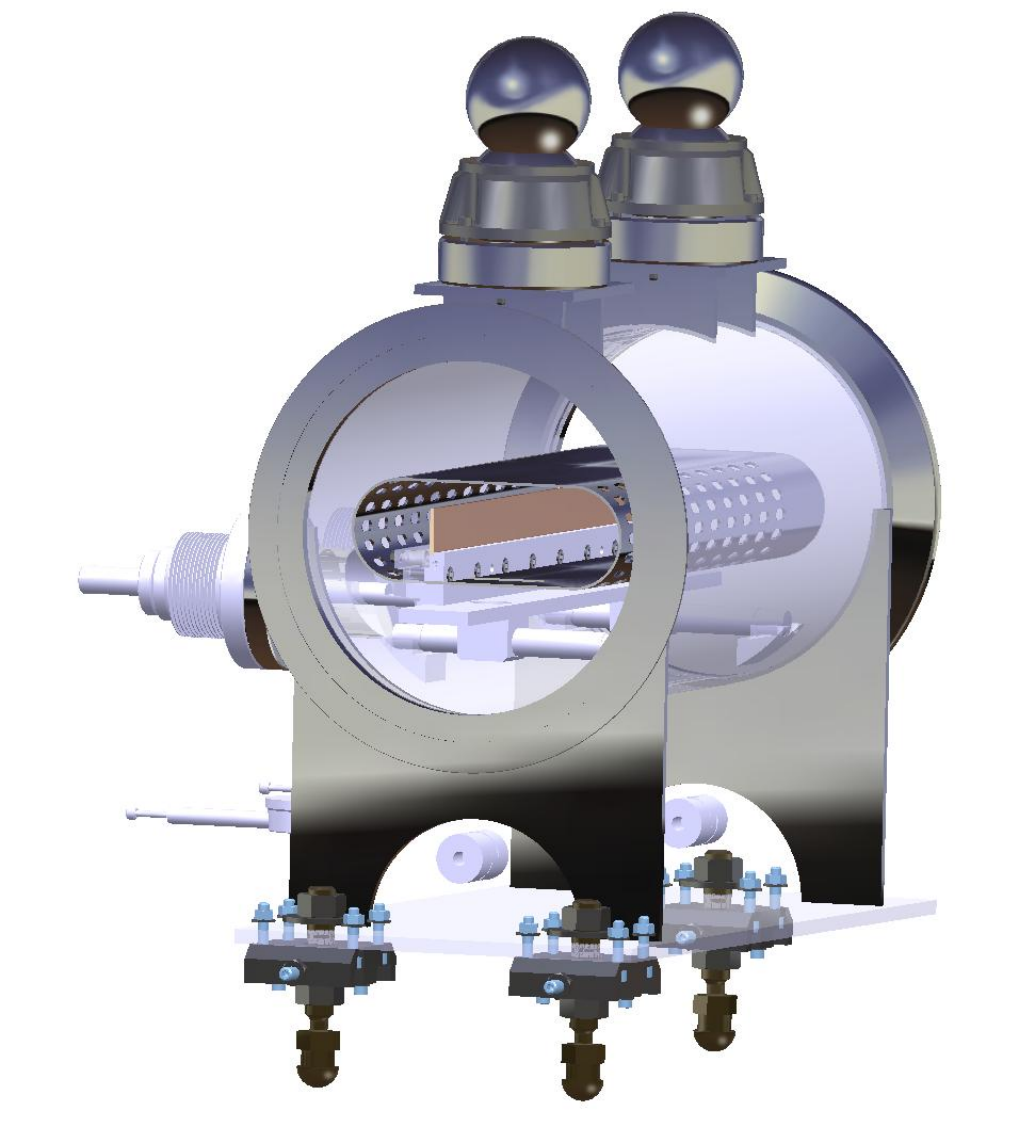
Fit adjustable supports and internal displacement system to vessel.

Insert beam impedance screen

Fit passive blade assembly to the displacement system

Fit bellows and linkage system to vessel and attach linkage to internal displacement system

Calibrate system with pots and dial gauges

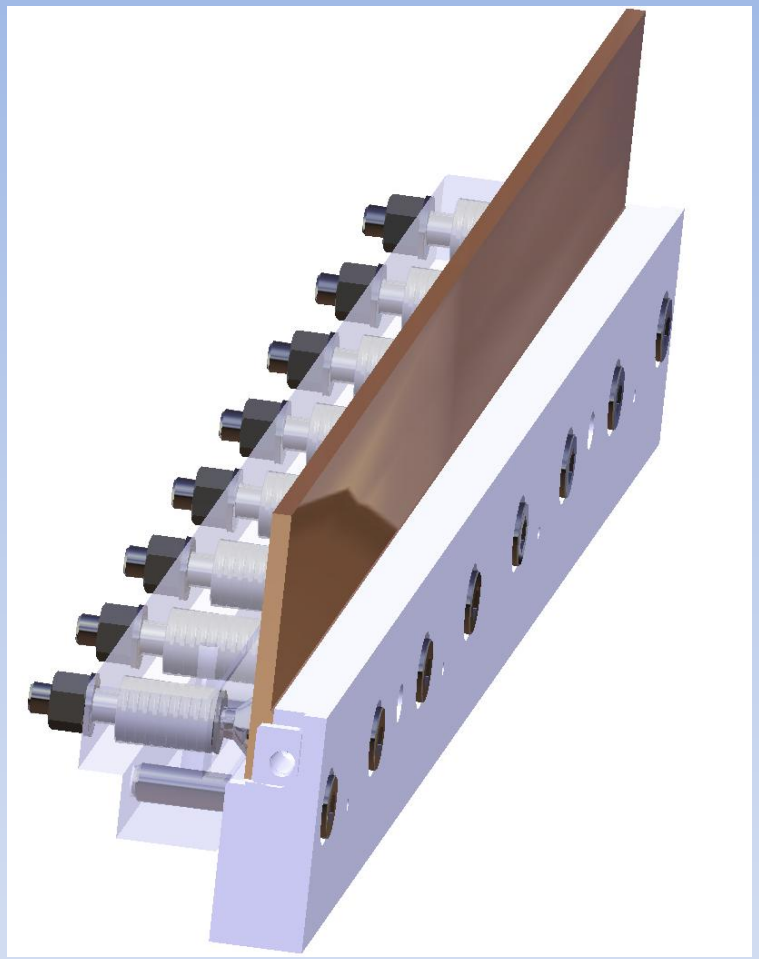


# Blade Assembly

The new dummy septum is conceived to be a 40 cm long, 3.88 cm high and 3 mm thick blade inside the beam tube. Two materials are being considered, copper and tungsten, and one goal of this study was to choose between the two on the basis of the minimal amount of secondary's produced . The blade is placed in the middle of the straight section 15 along the beam direction.

The blade shall be clamped to a simplified support structure using a system of wedges.

The energy dissipated in the blade can be evacuated using either a conventional water cooling circuit or by using a heat sink connected to an out of vacuum secondary cooling circuit.

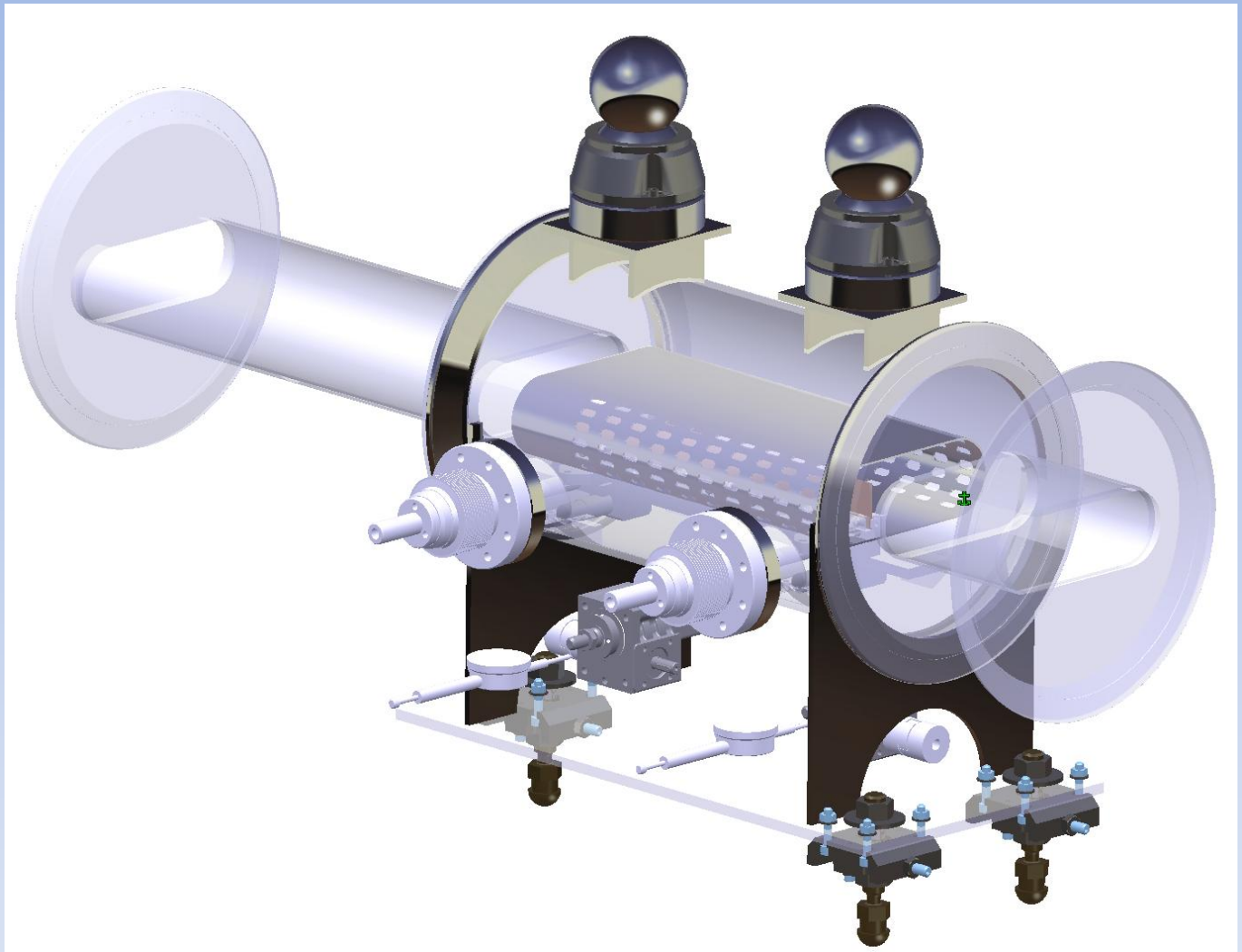


The above system shall be simplified

# Vacuum Chambers

Upstream and downstream chambers have same cross section as PS vacuum chamber (Optimised for impedance).

This allows for access to the vessel for installation and also allows for installation of more substantial shielding on downstream side.



# Shielding

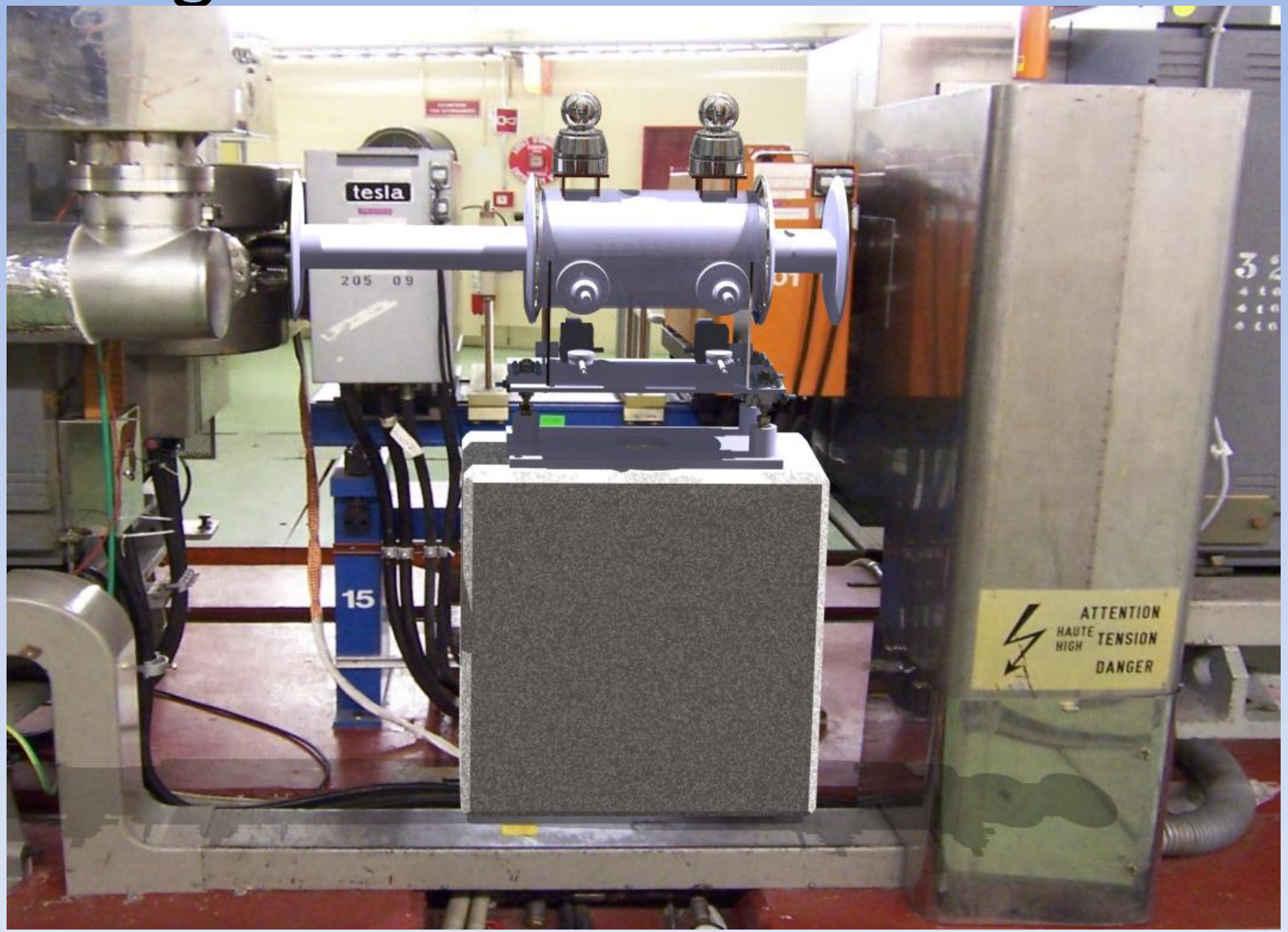
All standard blocks

Allows for shielding in downstream side

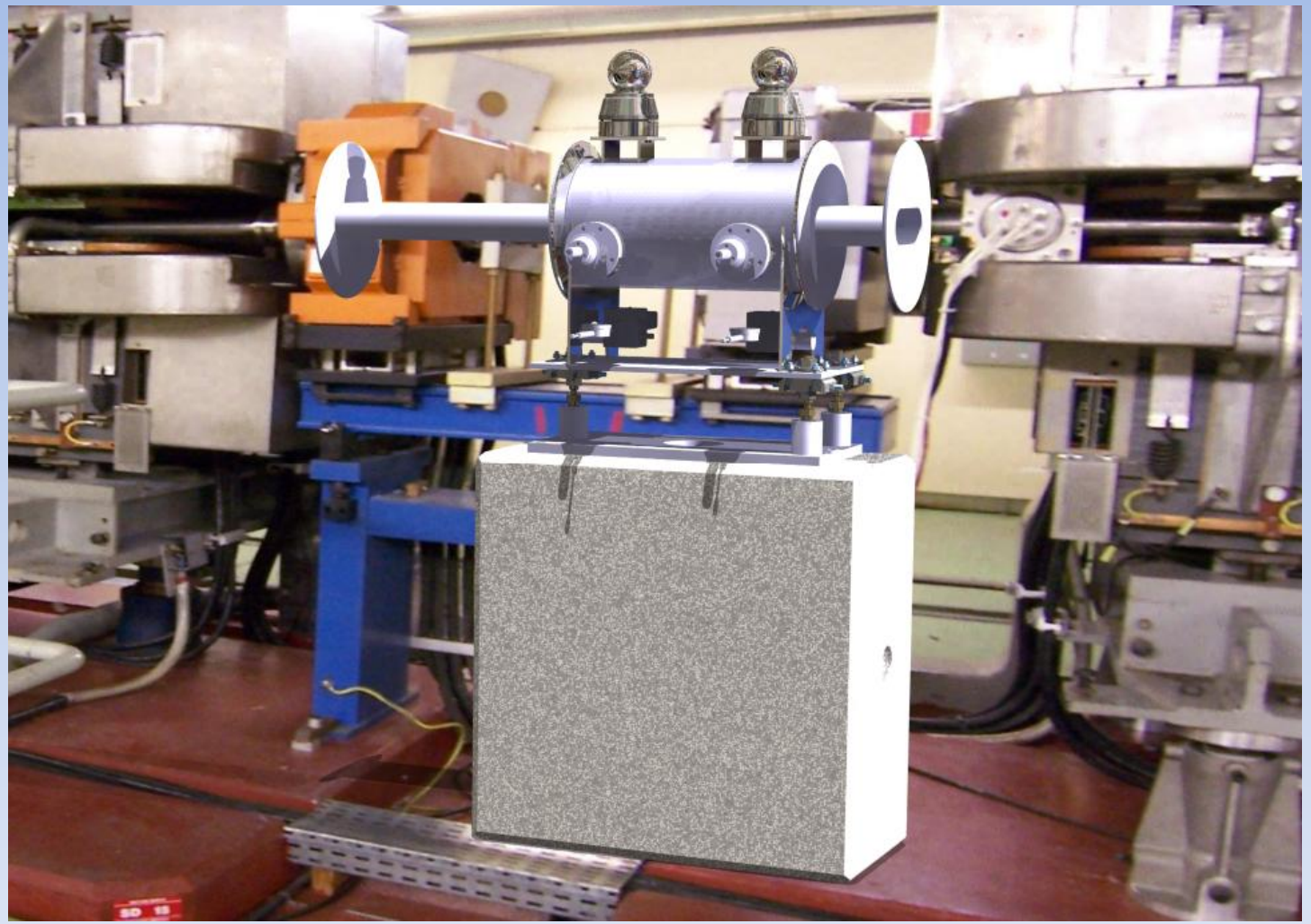
Floor completely shielded

Access to be reserved for drive motors and shafts

# “…integration in section 15”



# Tunnel Integration



# Summary

Blade Material- Tungsten

3 separate chamber sections-allows for access,

Remote handling?

Standard Shielding

Questions ??