Alignment of STF Cavities

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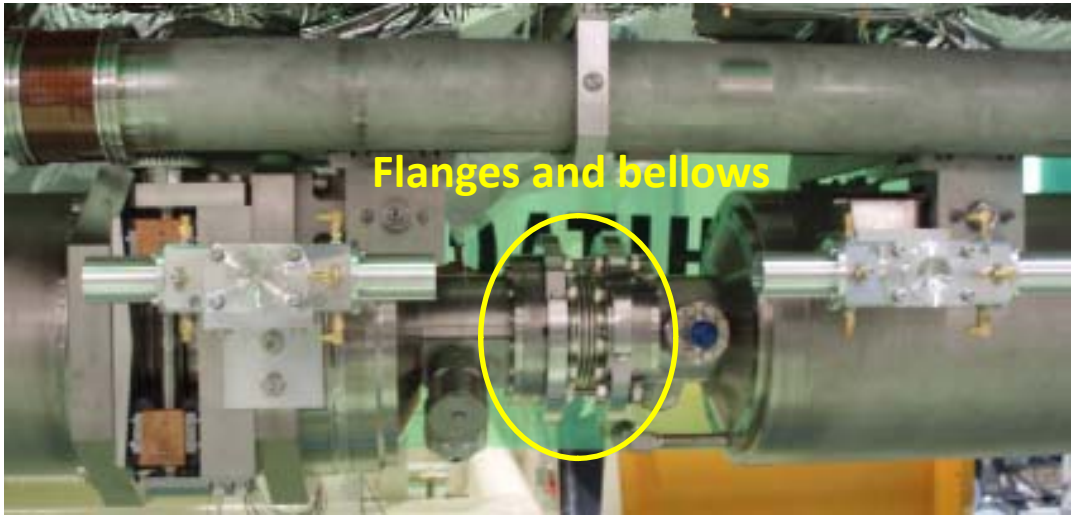
Alignment Procedure of the Cavity-vessels, the Cold mass and Cryomodule

1. Make a string of four cavity-vessels in the clean room with aligning the mechanical rotation of the vessel.
2. Survey the mechanical center of the helium vessel as the cavity axis.
3. Transfer the mechanical axis to the fiducials (WPM) on the helium vessel.
4. The cold mass (Gas Return Pipe, GRP, and cryogenic components) is aligned with the standard points on the supports posts.
5. The four cavity string is connected to the GRP.
6. The axis of the four cavity vessels is aligned with the standards points on the support posts.
7. The cold mass with the four cavity string is installed into the vacuum vessel to form the cryomodule, and this cryomodule is aligned to the beam line with the standard points.

Making a string of four cavity-vessels with aligning mechanical rotation of vessel

1. Alignment of the rotating angle of the cavity-vessel is performed with the tuner plate.
2. Rotation of the cavity vessels are aligned before connecting the cavity-vessels.

Four cavity-vessels in a string



Survey of the mechanical center of the helium vessel as the cavity axis

1. The mechanical axis of the helium vessel as the cavity axis is defined by the mechanical centers of the both end plates which are machine-processed by a NC machine.

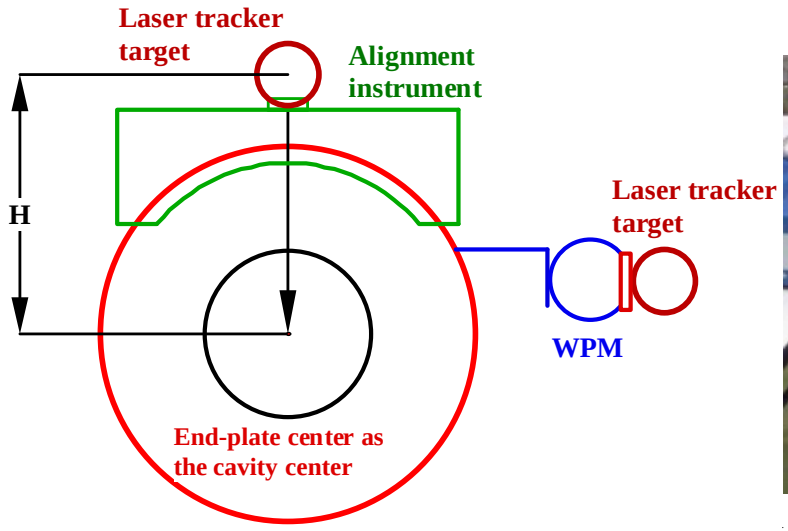
2. The special instruments are attached to the periphery of the end plate, and aligned with respect to the gravity. The mechanical center of the plate places under the center of this instrument.

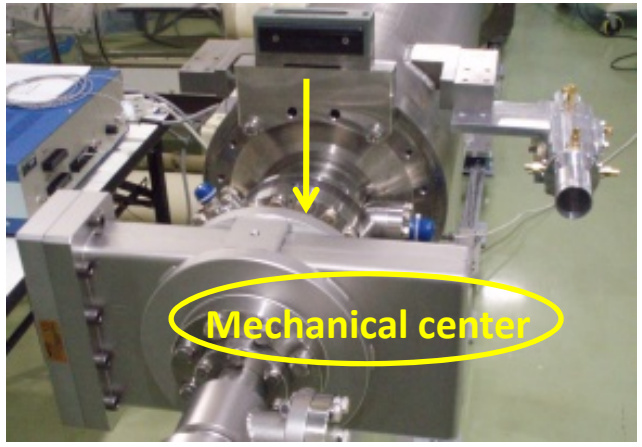
The surface of the instrument can be aligned with the precision of +/- 0.1 mrad.

Since H=165 mm, the error of the position of the end plate center corresponds to 0.0165 mm.

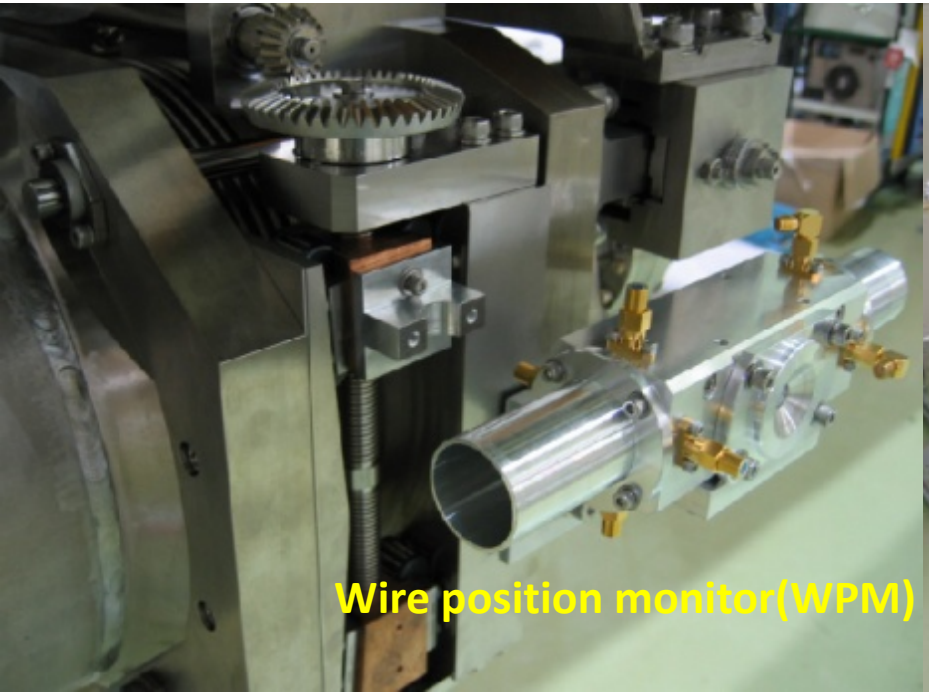
3. The center location on the surface of the alignment instrument is measured by the Laser Tracker.

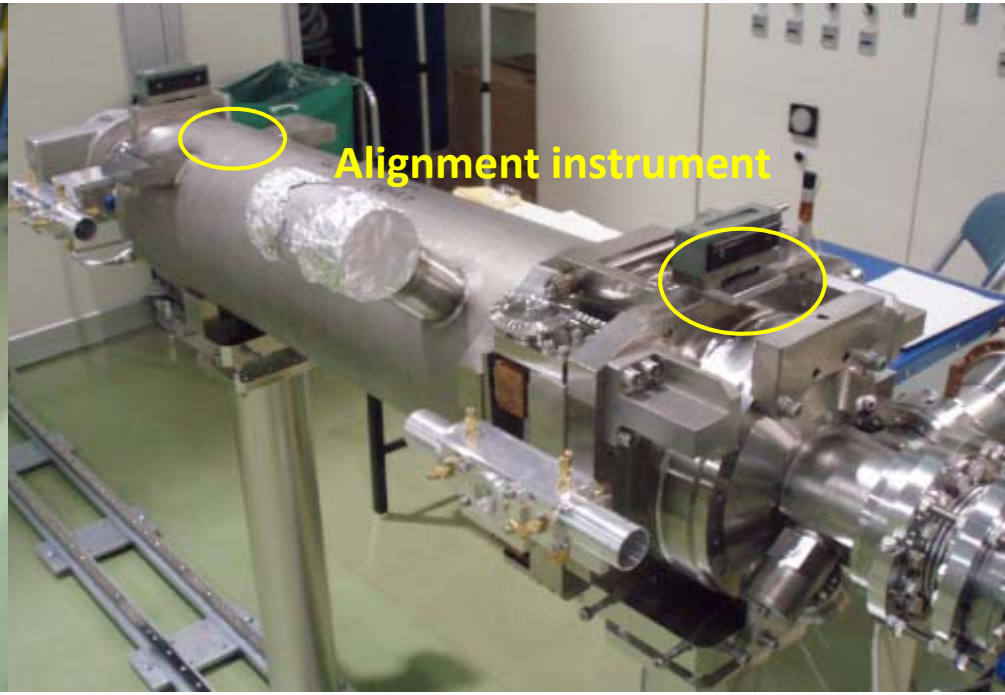
4. This mechanical center position is transferred to the surface of the WPM.





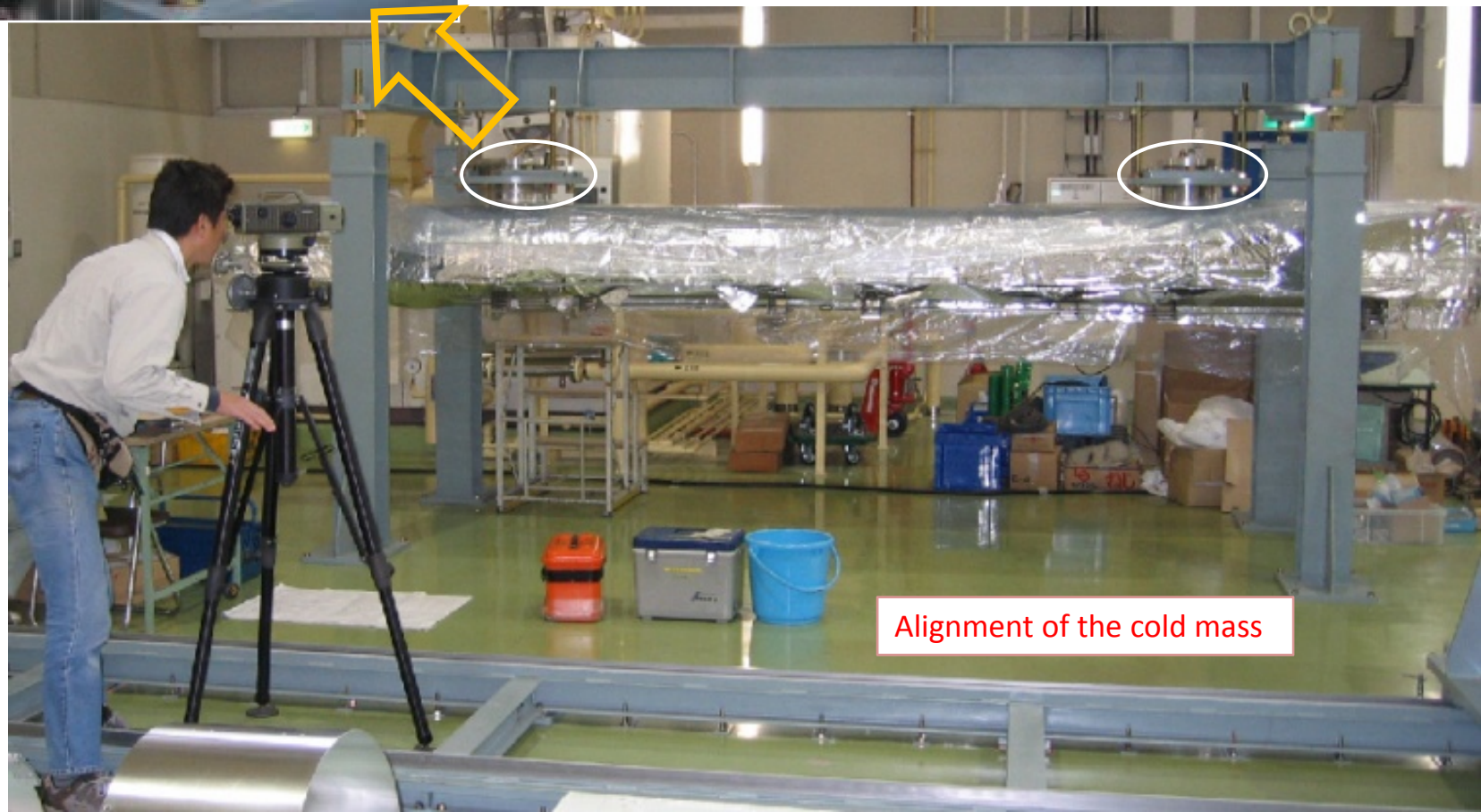
Wire-position monitor on the vessel





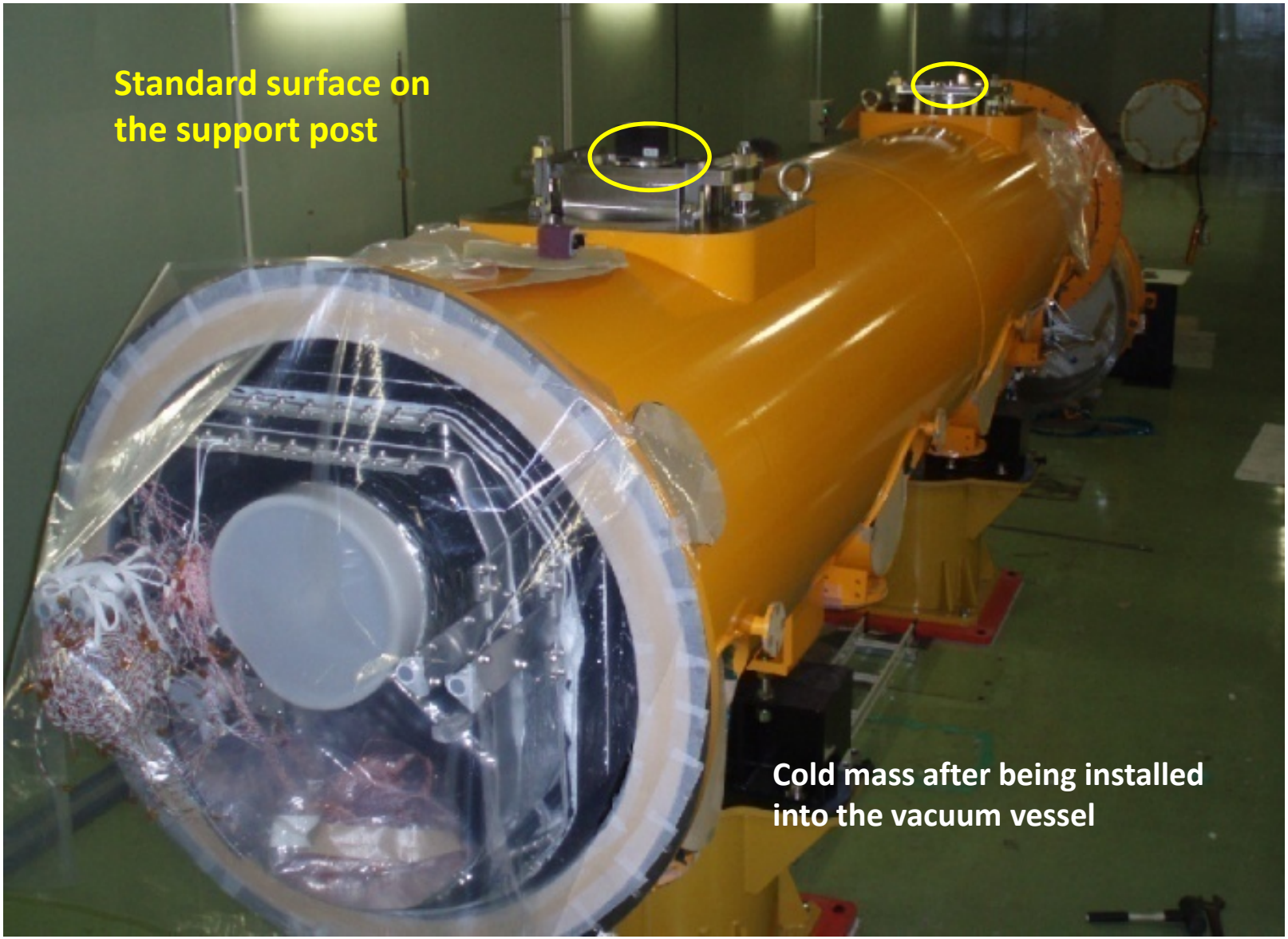
Surveying the shape of cavity vessel

Alignment of gas return pipe and cavity jackets with the standard points on the support posts



Alignment and survey of the positions of cavity-vessels after assembling a cavity-string under the GRP

1. The positions of each cavity-vessel are measured with the fiducials on the WPMs by the Laser Tracker with respect to the standard points on the support posts.


Standard surface on
the support post
Cold mass after being installed
into the vacuum vessel