



JAERI

Center for

Proton Accelerator Facilities

Target Remote Handling System

Neutron Facility Development Group

Center for High Intensity Proton Accelerator Facilities

Japan Atomic Energy Research Institute (JAERI)

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Cutaway View of the Target Station



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Neutron beam shutters

Mercury circulation system

(Supplying mercury to the target vessel at the maximum flow rates of 0.8m³/min, and is fixed on the target trolley)

Biological shielding

In-cell crane and power manipulator

(To exchange the target vessel, mercury circulation components etc.)

13m
x 12m

Neutron beam line

Helium vessel

Master-slave manipulators

Target maintenance room

Target storage cask

Proton beam line

Mercury Target

(fixed on the target trolley)

Target trolley

(moves horizontally to maintenance room)

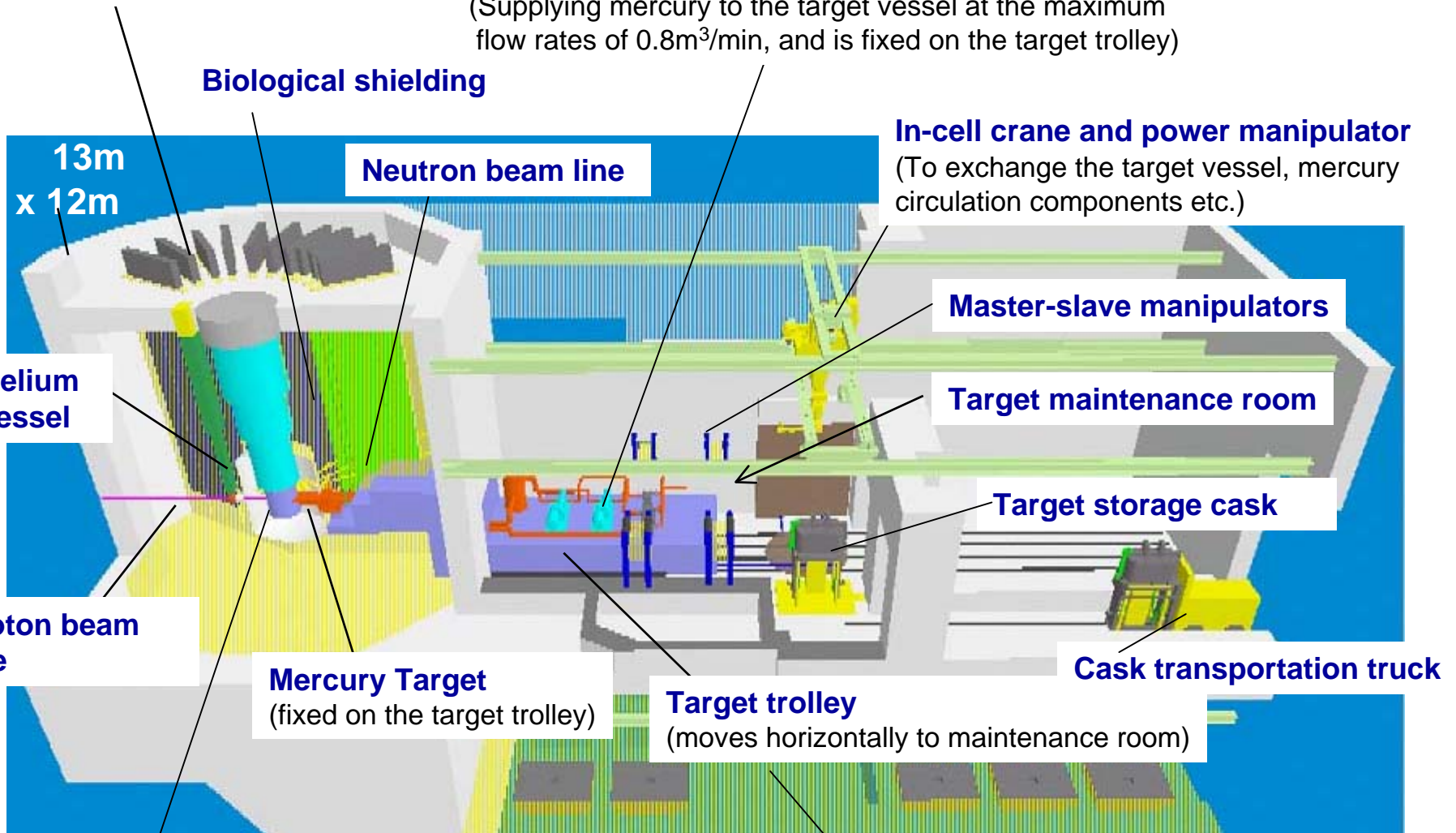
Cask transportation truck

Reflector/Moderator Assembly

(Fixed on an exchanging plug, and stored in a He vessel. Neutron generated at the target are transferred through this assembly and beam shutters to the neutron beam lines.)

Storage room

(Store spent components - target vessels etc. located in the basement)



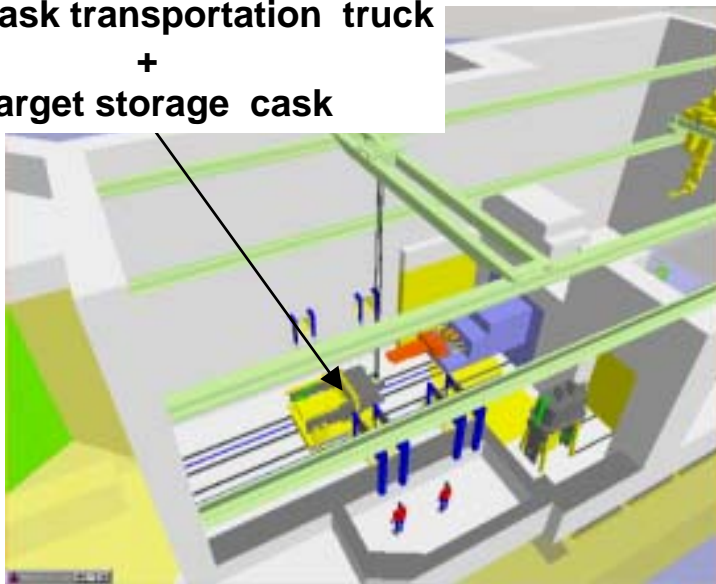
Simulation of Target container replacement



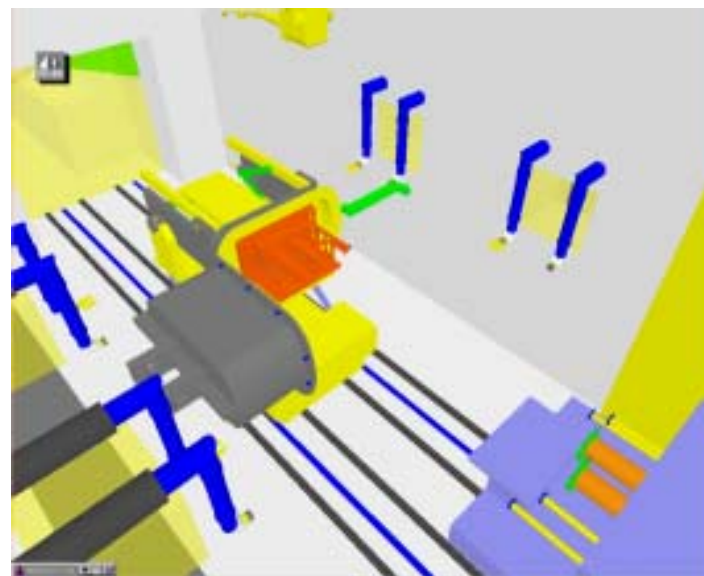
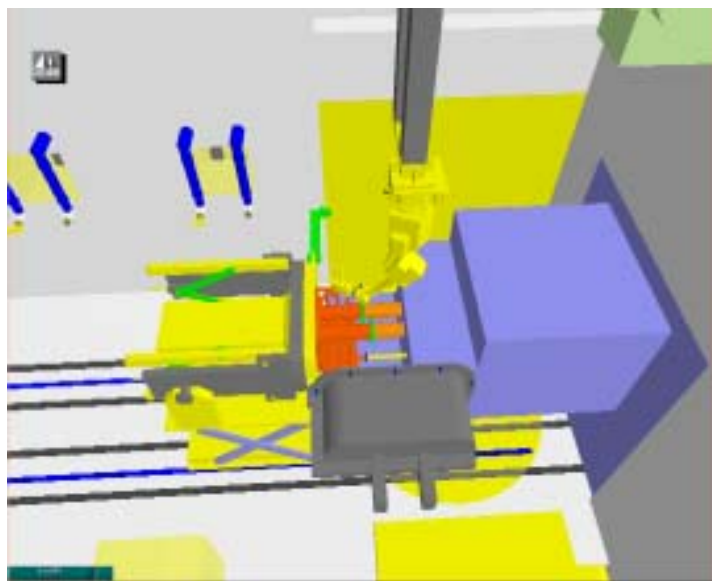
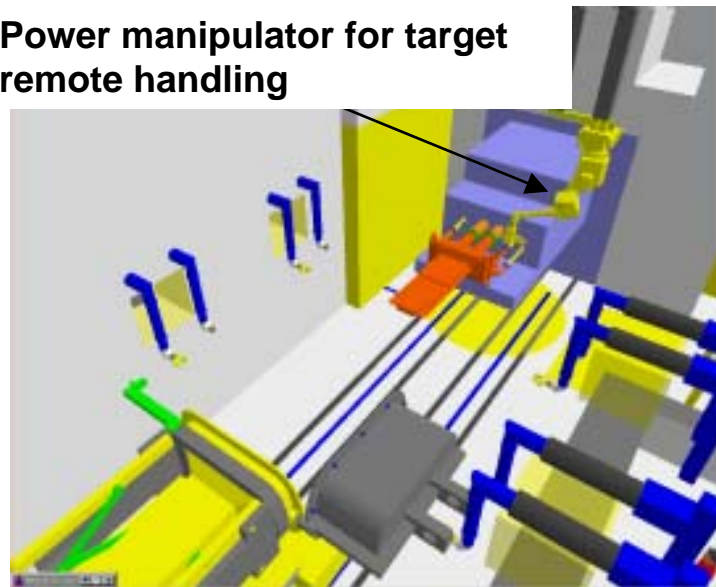
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Cask transportation truck
+
Target storage cask



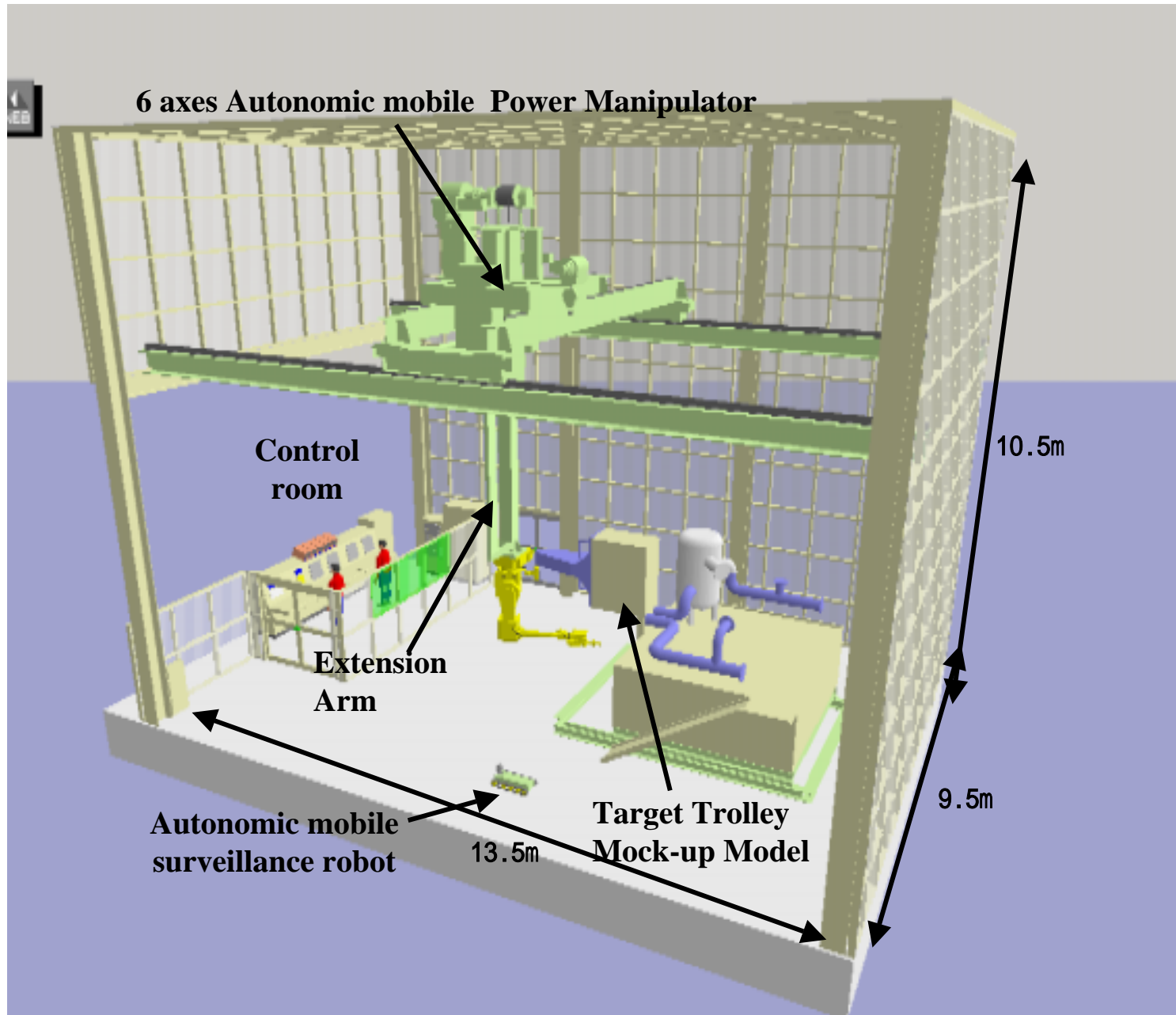
Power manipulator for target remote handling



Layout of the Remote Handling Demonstration test Facility



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Outline of Remote-handling test facility



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6 axis power-manipulator with over-head traveling unit

Six(6) axis power-manipulator specification

Arm length	: 1,500 mm
Max. handling weight	: 45 kg
Body weight	: 570 kg
Control method	: Remote control by cable (with three-dimensional camera)
On board sensors	: Micro color CCD camera Laser type position sensor



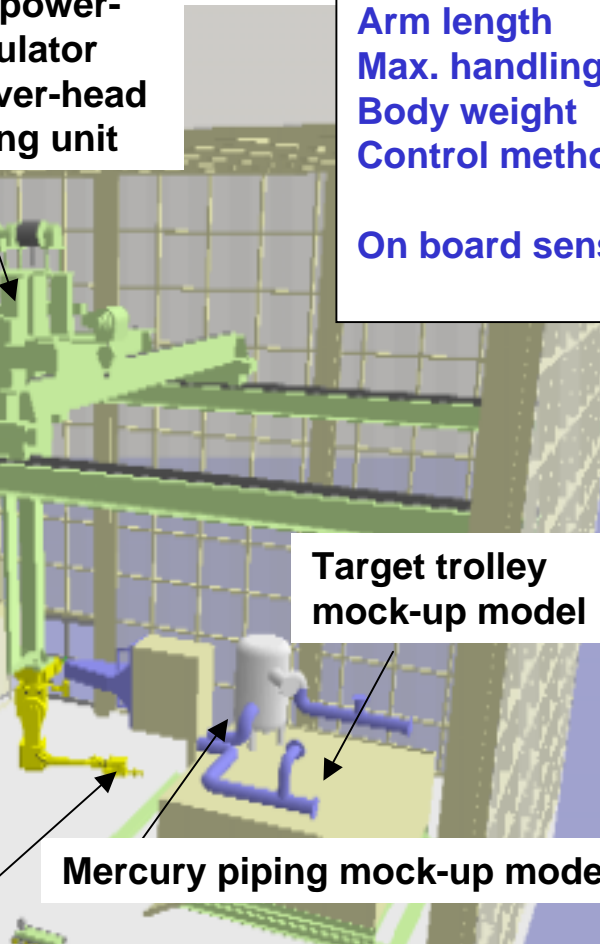
Control room

Power manipulator control panel

Expansion and contraction arm (Stroke :4500mm)

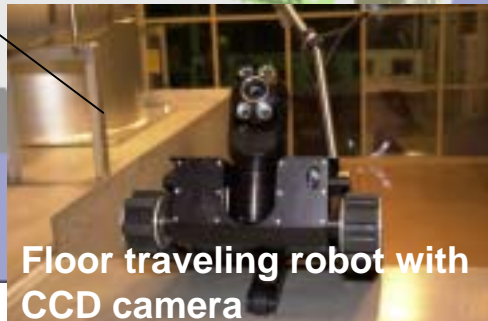


End effector



Target trolley mock-up model

Mercury piping mock-up model



Floor traveling robot with CCD camera



Expansion and contraction arm

End effectors (tools)

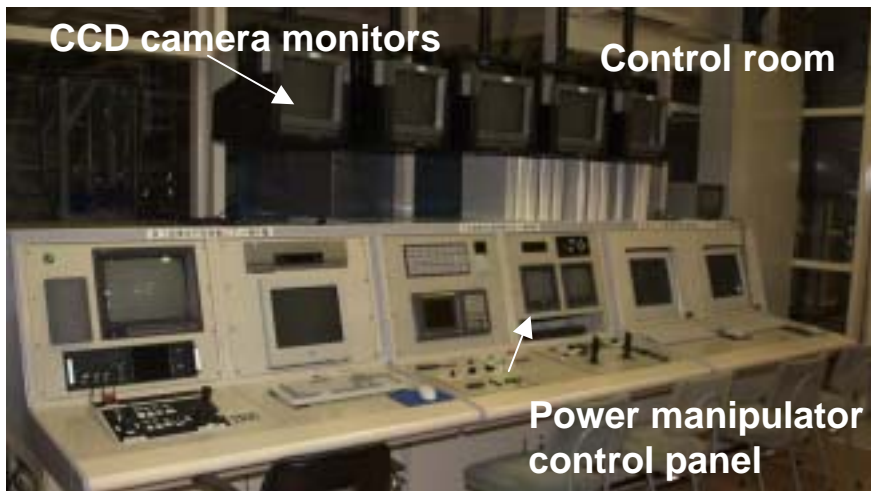
- Air-driving impact wrench for bolt and nut
- Grip hand

Outline of Remote-handling test facility



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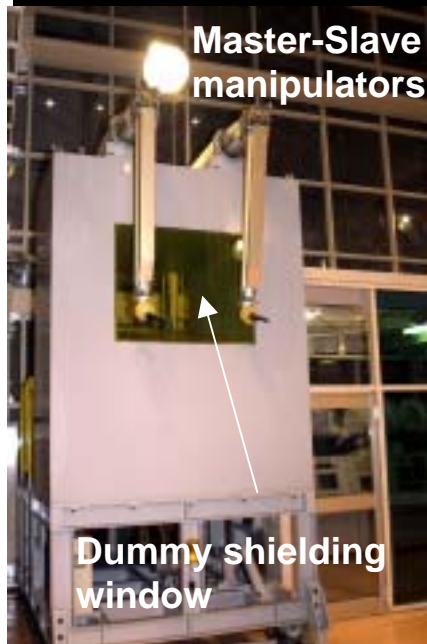


CCD camera monitors

Control room

Power manipulator control panel

Man-Machine Interface program is installed.
Power manipulator is controlled automatically.



Master-Slave manipulators

Dummy shielding window



Target, piping and tank models



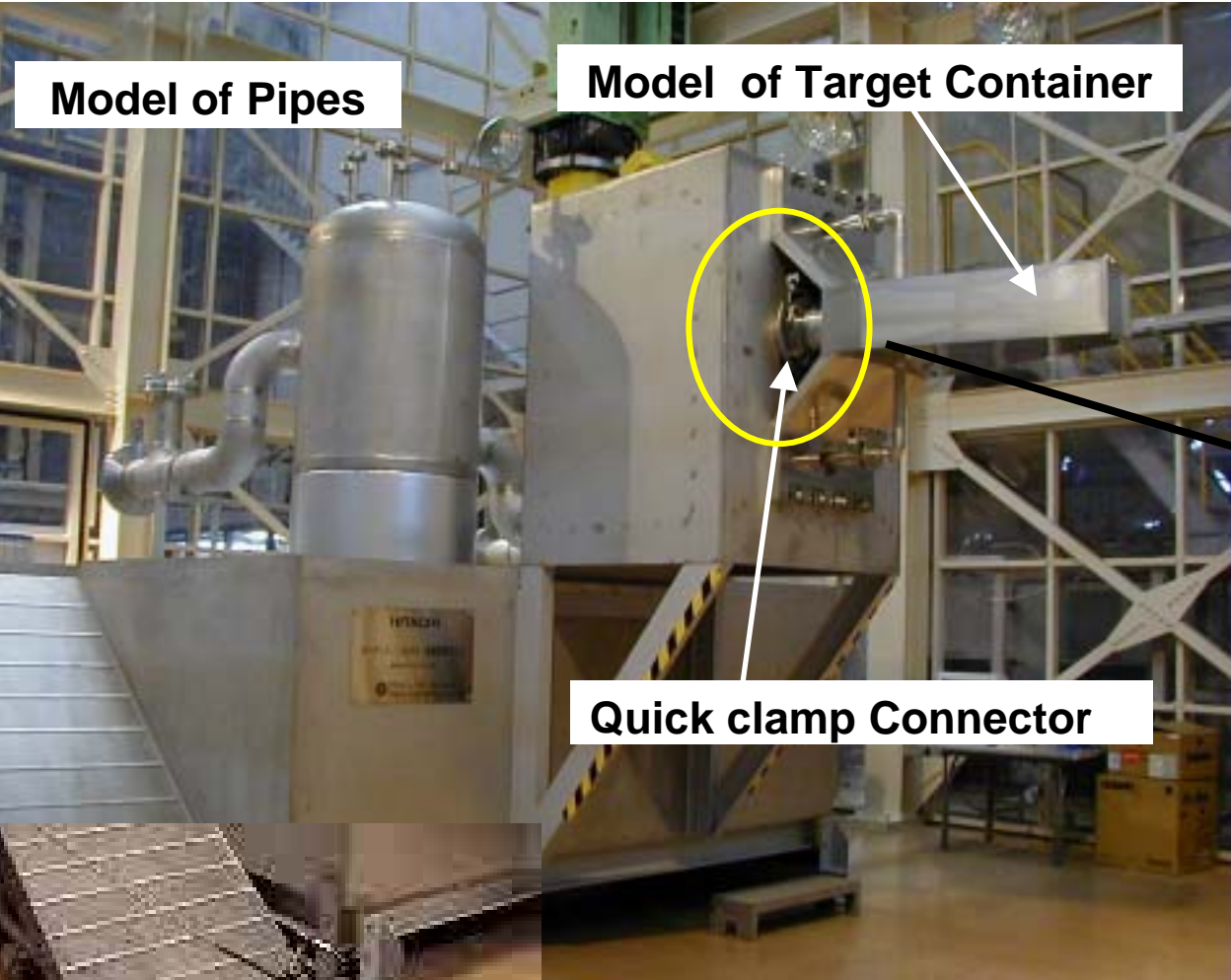
Overhead traveling Unit for power manipulator

Expansion and contraction arm

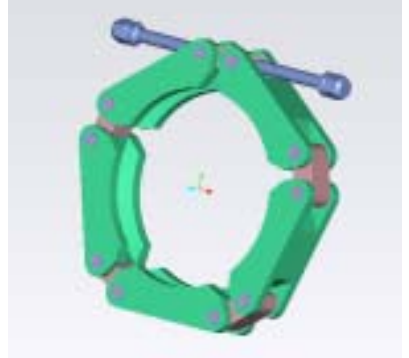
Light

6 axis Power manipulator

Mock-up Model of the Target Trolley



Detail of Quickclamp Connector



Conditions of Preliminary Test Using Demonstration Test Facility (1)



End-effector approaches anchor bolts

Automatic Exchange of End-effector



End-effector approaches Quickclamp

Conditions of Preliminary Test Using Demonstration Test Facility (2)



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**Autonomic mobile
surveillance robot**



**End-effector approaches Remote Flange
Bolt (from vertical direction)**



**End-effector approaches Remote Flange
Bolt (from horizontal direction)**

Summary



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3-D simulation was conducted and exchange devices are selected and designed.



Fundamental function tests of the target remote-handling were also successfully finished.



The remote handling system for the MLF are now designed. which should be with shielding effect and be adopted for reflector and moderator exchange.

The problem in remote handling to consider is Effluent mercury treatment.