Rokkasho Cask Maintenance Facility

H. Yamada, M. Nakatani, N. Furuta, K. Ogawa, M. Shiratani
Kobe Steel Ltd.
Nissei Higobashi Bldg.6-14, 1-chome, Edobori, Nishi-ku, Osaka, 550-0002 JAPAN

Introduction

In a nuclear fuel cycle, it is important for to transport spent fuel from a reactor site to a reprocessing plant safely. In Currently, a commercial reprocessing plant is being built at Rokkasho, in Aomori, and, at the same time, the Rokkasho Cask Maintenance Facility is under construction next to a storage pool for spent fuel in a reprocessing plant.
The purpose of this facility is to maintain many casks for spent fuel systematically. This facility for cask maintenance is the only facility of its kind in Japan.

Description of the actual process at the Rokkasho Cask Maintenance Facility

This facility will maintain six types of NFT Cask and three types of HZ Cask. This facility can maintain thirty casks in a year. Four processes are carried out in this facility, 1) Receiving process, 2) Decontamination process, 3) Maintenance process and 4) Delivering process. The Receiving process receives the cask from the Cask Storage Room by using a Cask Transfer Dolly in Horizontal Position and sets the Cask on the Cask Transfer Dolly in Vertical Position by using an Overhead Traveling Crane for Maintenance Room. The Decontamination process decontaminates the Internal Cavity(1), Structure(2), and Cask Lid, so the radioactive materials can be removed. The Maintenance process carries out inspections, tests, checks, and maintenance of casks inside and outside. The Delivering process transfers the cask from the Maintenance Room to the Cask Setting up Room by using an Overhead Traveling Crane for Maintenance Room and delivers the Cask to the Cask Storage Room by using a Cask Transfer Dolly in Horizontal Position. Assuming these four processes are one cycle, one cycle which deals with one cask takes about seventeen days to be completed.
Figures 1-1,1-2 show the Material Handling Flow of Rokkasho Cask Maintenance Facility.
This facility consists of a Decontamination Room and a Maintenance Room. Figure 2 is a photograph of the engineering model of Decontamination Room taken from the side. Figure 3 is a photograph of the engineering model of Maintenance Room taken from the front. The Decontamination room is equipped with decontamination devices to reduce the radiation dose in the cask. The main equipment for decontamination is as follows.

- Cask Transfer Dolly in Vertical Position.
- Overhead Traveling Crane for Decontamination Room.
  Rated load: Main hoist 10t／Auxiliary hoist 2t
- Structure Removing Handling Frame. (7sets)
- Washing Bar (for internal cavity).
- Cask Lid Washing Tank.
- US Bar for Inside of the Structure.
- Structure Washing Pit.
- Shielded Doors. (2sets)

- Shielded Windows. (4sets)
- Master Sleeve Manipulator. (3sets)

The decontamination work is carried out remotely by using the Overhead Traveling Crane for Decontamination Room and Master Sleeve Manipulator. The work has to be ensured either by viewing through the Shielded Window or ITV camera. The clearance between the Internal cavity and the Structure is about 3.5mm. So it is very difficult to remove the Structure from the Cask and insert the Structure into the Cask by remote control. There are two methods of decontamination. High-Pressure Water Jets decontaminate the Internal Cavity and Cask Lid. This method is effective for decontaminating smooth surfaces. Ultrasonic Waves decontaminate the Structure in the water. This method is effective for decontaminating complex shapes. The Decontamination process generates waste liquid. The waste liquid is stored in the reservoir tank for a time. Then the waste liquid is transferred to another facility and it is disposed there.

The purpose of the Maintenance Room is cask maintenance. The Maintenance process is carried out after the Decontamination process, so workers can directly maintain the Cask.

The main equipment for maintenance is as follows.

- Overhead Traveling Crane for Maintenance Room
  Rated load: Main hoist 125t／Auxiliary hoist 5t
- Maintenance Deck Frame (2sets)
- Cask Removing Handling Frame (Rated load: 115t)
- Others (tools for Maintenance)

The Maintenance Room has two Maintenance Deck Frames. Therefore, this facility can maintain two casks at the same time. Maintenance is carried out for one cask every year, every three years, or every ten years, as needed:

every year
- Periodic self inspection items
  (E.g. Appearance test, Sealing test, and Sub-critical test)
- Maintenance work based on the result of periodic self inspection

every three-years
- Test and check of Seals
- Test and check of Surface Flaws
- Test and check of Dimensions
- Exchange of cask elements.

every ten-years
- Check of Structure
- Hydrostatic test.

We can keep on Casks sound by carrying out strict cask maintenance. Therefore, the Rokkasho Cask Maintenance Facility will bring about the safe transport of spent fuel.

(1)：Inside of the Cask.
(2)：The Structure is contained in the cask in order to hold the spent fuel in the right position.

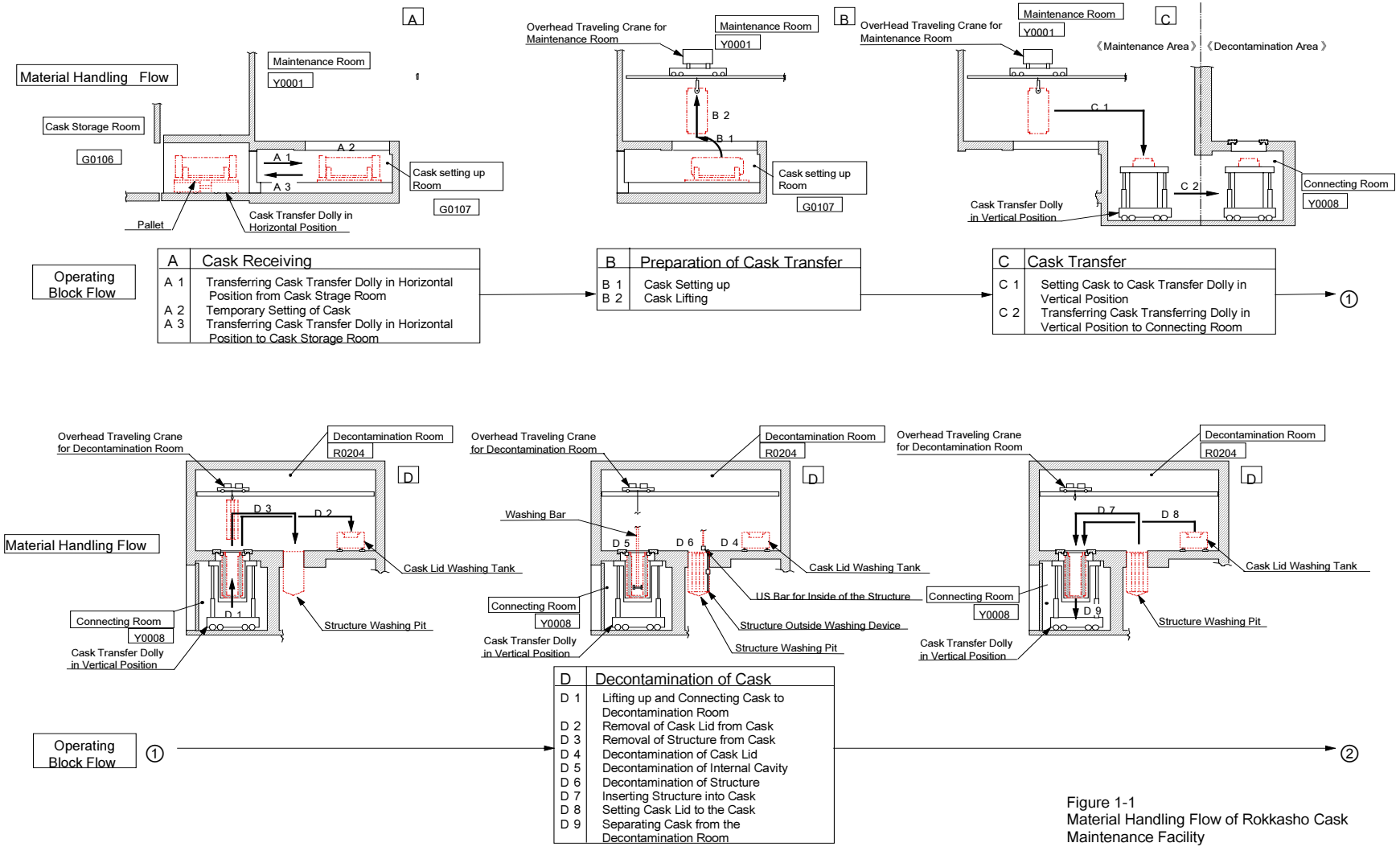

Figure 1-1
Material Handling Flow of Rokkasho Cask Maintenance Facility

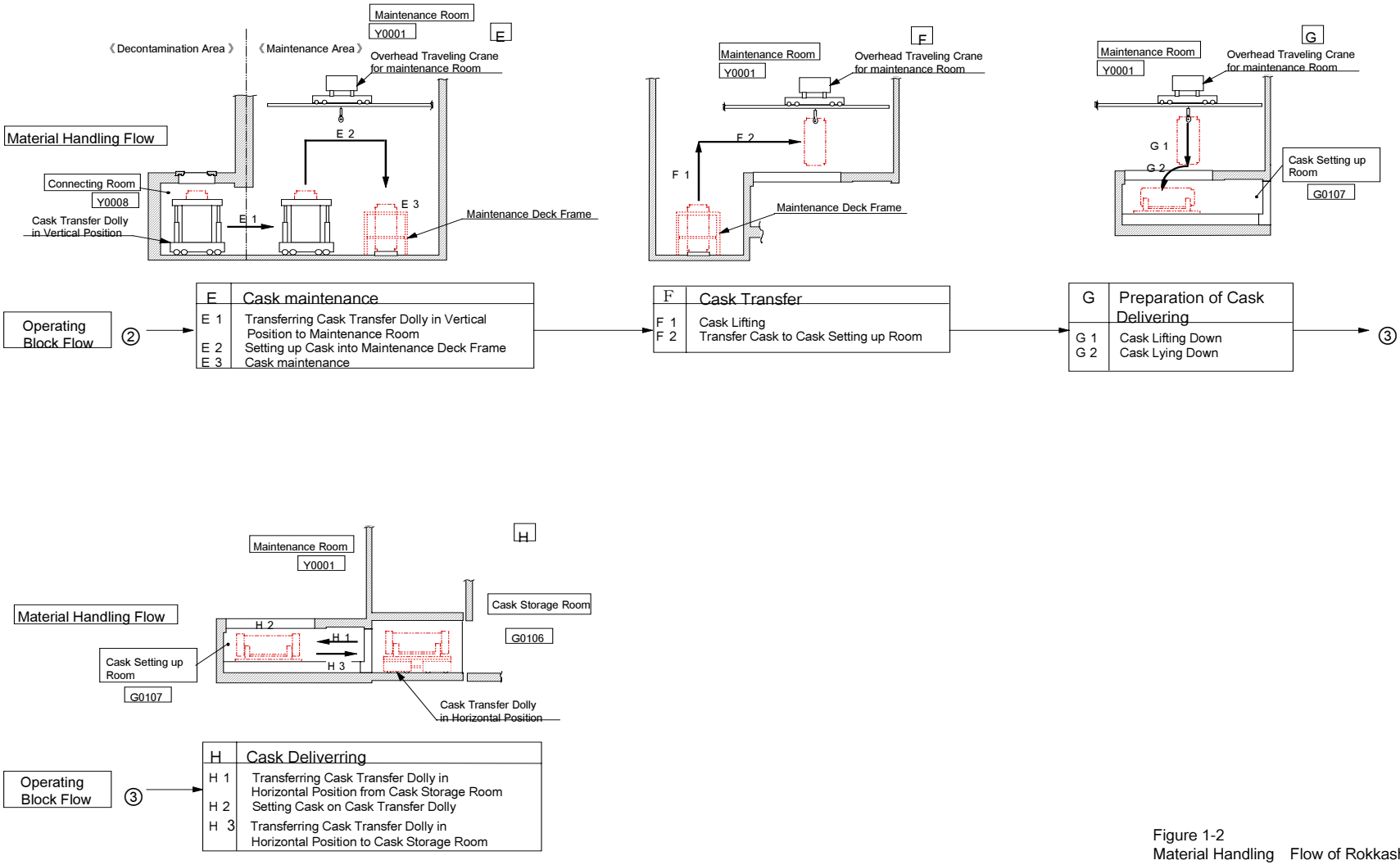

Figure 1-2
Material Handling Flow of Rokkasho
Cask Maintenance Facility

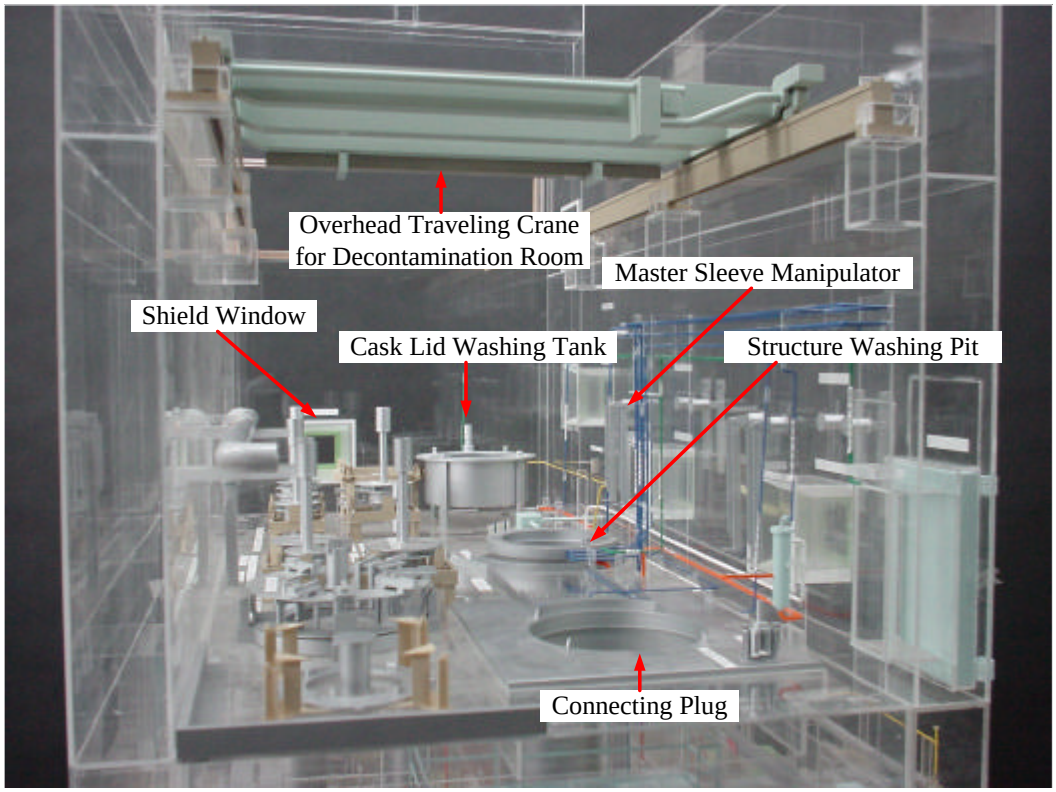

Figure 2. the photograph of engineering model of Decontamination Room

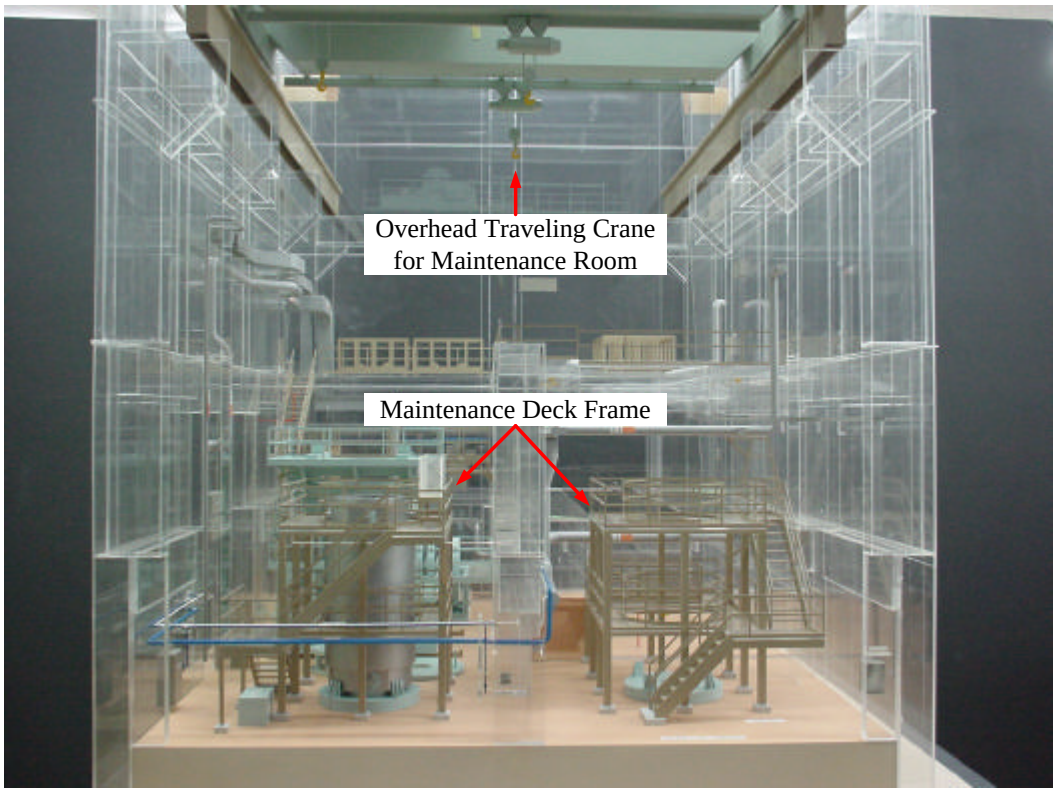

Figure 3. the photograph of engineering model of Maintenance Room