FUELLING MACHINE TEST FACILITY (FMTF)

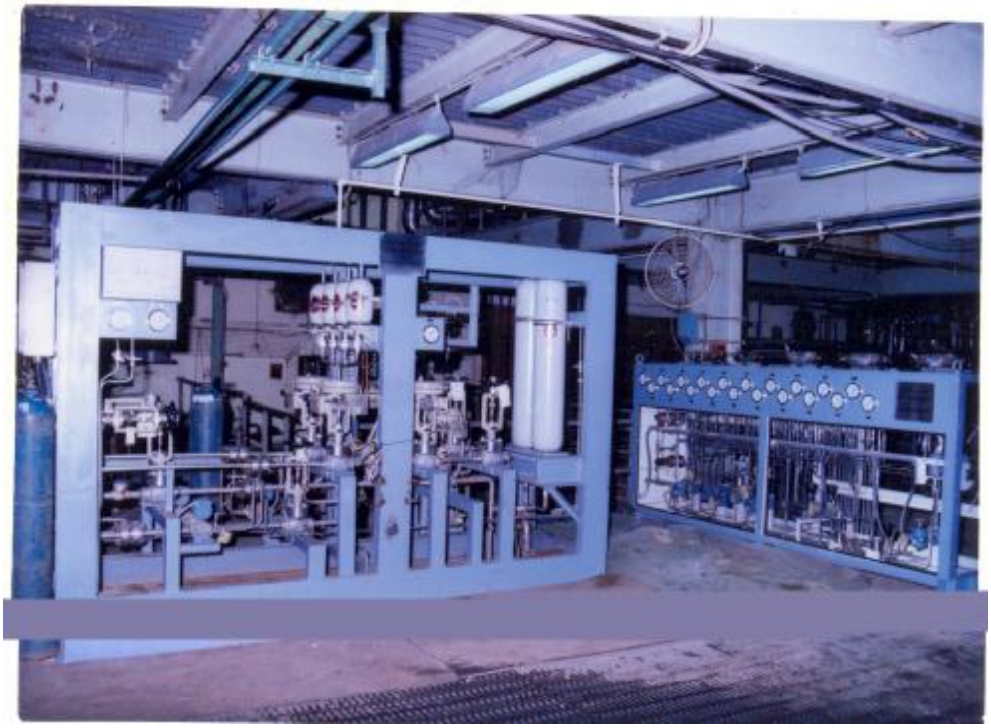
The Fuelling Machine Test Facility consists of following major systems/ equipments:

- **Main Loop:**
  Main loop is a closed, deminerialized water recirculation system to simulate flow, pressure and temperature of the reactor coolant channel condition. This system along with associated instrumentation was designed, fabricated, installed and connected to the existing Integral Thermal Facility (ITF) at Engg. Hall no. 7, RTD, BARC.

  One full length coolant channel assembly consisting of 13 numbers of fuel bundles and fuel locator, shield plug, seal plug at either end, was installed and connected to the main loop. Main components like pressure tube, End fittings, and various plugs were provided by NPCIL.
- **Head Water supply system (HWSS)**:
  Head water supply system supplies water to the Fuelling Machine Head through valve station and actuator cabinet at required pressure and flow at ambient temperature for different operating modes of FM operation. This system is required for FM magazine, cooling of various shaft seals, to operate various actuators like Ram-B, Ram-C, guide sleeve lock, snout emergency lock and separator assembly.

  This system consists of a Triplex plunger reciprocating Pump, control valve station, actuator cabinet, interconnecting piping & tubing and associated instrumentation and control system.
- **Oil Hydraulic System:**
  The oil hydraulic system consists of a power pack, valve panel and interconnecting high pressure piping, tubing and hose catenaries. It supplies oil at various pressures and flows to control the force, speed, direction and position of various actuators like Ram-B, Ram-C, Latch Ram, Magazine, Snout clamp mounted on Fuelling Machine and X-motion, Y-fine and Z-motion mounted on Test Carriage.
- **Fuelling Machine Test Carriage:**
  The fuelling machine test carriage has X-drive, Y-fine and Z-drive to align the FM head with coolant channel. It consists of support columns, Bridge assembly, trolley assembly, top beam assembly and upper Gimbal assembly.

FM HEAD & TEST CARRIAGE OF 540 MWe PHWR AT ENGG HALL-7, RTD, BARC



WATER HYDRAULIC SYSTEM OF 540 MWe PHWR AT ENGG HALL-7, RTD, BARC

COOLANT CHANNEL OF 540 MWe PHWR

OIL HYDRAULIC SYSTEM OF 540 MWe PHWR

RAM ASSEMBLY TEST FACILITY (RATF):

A separate RATF was installed to test the ram assembly, which is one of the main sub-assemblies of the FM Head. The RATF consists of Ram assembly test rig, End fitting Trolley, oil hydraulic power pack, oil hydraulic system, back up water hydraulic system and associated instrumentation and control system.

TESTING OF RAM ASSEMBLY AND FUELLING MACHINE OF 540 MWe PHWR:

The Fuelling Machine of 540 MWe PHWR Reactor is most important & intricate equipment. Due to many changes in the design of 540 MWe PHWR Fuelling Machine Head from 220 MWe F/M Head, elaborate testing of F/M Head & its major sub-assemblies were carried out. Ram Assembly is one of the important subassembly of the Fuelling Machine Head.

TESTING OF RAM ASSEMBLY:

The Ram Assembly was tested in Ram Assembly Test Facility (RATF). The Ram assembly mainly comprises of three telescopic rams namely B Ram, C Ram & Latch Ram. All these rams are operated through Oil Hydraulic motors. B Ram & C Ram is also provided with water hydraulic back up. These rams are used for refuelling operations & various plug operations.

540 MWe PHWR RAM ASSEMBLY

Extensive testing was necessary to prove the design, to evaluate the life of different components and to specify the required surveillance when it is used for regular refueling in Reactor. During testing, following problems were identified, analysed & subsequently all the problems were rectified and implemented in all other FM Heads.

TESTING OF F/M HEAD:

The F/M Head was tested in Fuelling Machine Test Facility (FMTF). Fuelling Machine (F/M) head comprises of various important sub assemblies namely Separator assembly, Magazine assembly and Snout Assembly. Since F/M head is also a new kind of design, extensive testing was required to identify problems and to qualify for "On Power refueling' in reactor.

During testing problems were identified, analysed & subsequently rectification of all the problems were carried out.

The performance & acceptance tests as required were done in reactor simulated condition.

The Fuelling Machine Head was qualified with successful completion of above tests.