

Underwater Visual Inspection System- MIDAS II, IV and V

Background

Westinghouse has a long history as a proven leader at the forefront of nondestructive examination (NDE) innovation, in creating, using and applying innovative, advanced technology solutions to inspection challenges for customers worldwide.

Westinghouse uses an underwater visual inspection system (MIDAS II) consisting of a remotely controlled underwater vehicle equipped with cameras to perform various tasks from normal visual inspection to foreign body retrieval in hard-to-access areas such as main reactor coolant pipes, pumps, (see drawing below) or steam generator channel heads

Description

MIDAS II is a complete underwater visual inspection system whose main elements are a remotely controlled underwater vehicle with an integrated camera system that offers the following:

- Illumination (5x100 watt)
- Video color camera
- Video black and white camera
- Video color monitor
- Video recorder
- Text generator
- Video printer
- Control unit



Video color camera system

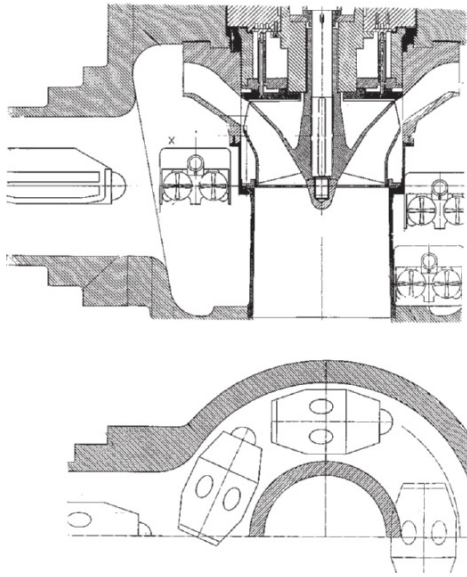
The underwater vessel is connected to the control unit by a 50-meter-long supply cable that is used both as a medium for remotely controlled data transfer and as a potential recovery line. The cable is counter-balanced for floating in the water.

MIDAS II has four torque-controlled propeller ducts; two for horizontal movements and the other two for vertical movements.

For the actual visual inspection, a video color camera system is installed in front of the vessel. The heart of the camera system is a 2/3-inch charge-coupled device (CCD) chip, which allows views in circumferential, horizontal, and vertical direction with 180-/360-degree rotation. This enables maximum flexibility during the visual inspection.

The camera is surrounded by the illumination. Backward movements can be controlled and observed by means of a black and white camera installed in the rear of the vessel.

All objects of interest such as welds, bolts, nozzles, thermos-elements or fuel assembly or control rod identification numbers can be inspected and documented according to defined procedures.



MIDAS II in reactor coolant pump

Experience

Since 1991, the MIDAS system has been applied very successfully in many plants for e.g. main reactor coolant pipe and pump housing inspections, as well as for foreign object retrieval. MIDAS also can be used as a carrier for other NDE inspection equipment. The free-floating vehicle allows for very fast and reliable travel to inspection areas.

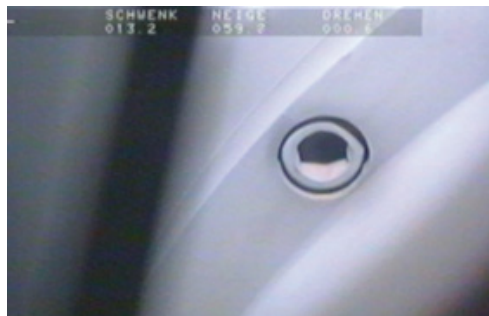


MIDAS II in reactor pool

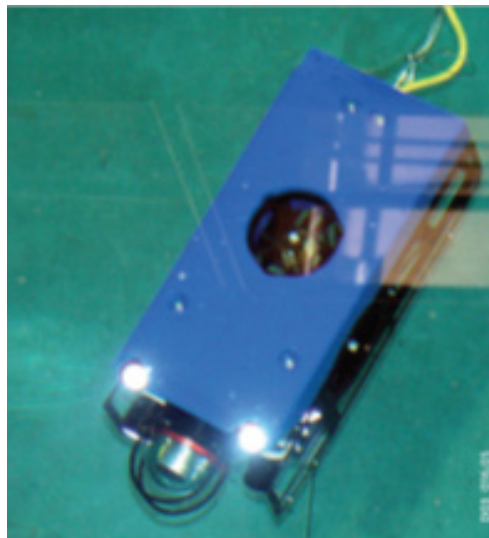
Benefits

The MIDAS concept offers the following benefits:

- Quick and easy installation and removal
- Visual inspections of difficult to reach areas such as:
 - Main loops
 - Primary pump
 - Reactor core internals
 - Steam generator channel heads
 - Fuel assembly and control rod
 - Identification numbers
- Retrieval of foreign objects
- Video documentation
- Flexible and adaptable base tool
 - MIDAS II and IV are designed for visual testing (VT) inspections
 - MIDAS V is used for VT inspections of pumps



Inside main coolant pump



Underwater vessel MIDAS IV