

# Vessel Head Manipulator - TRIM



## Time Reducing Inspection Manipulator

### Background and benefits

The manipulator solves the inspection demands for VHP (vessel head penetrations) together with latest probe technology. The concept is based on proven technology and will also free time on critical path due to the double action possibilities. End effectors can reach outside of the vessel head to minimize dose for the personnel.

As the first equipment in the nuclear industry it will work with two parallel end effectors to deliver the probes.

**For that reason our customers can plan for half the inspection time!**

Furthermore, the manipulator can also be used as a carrier for repair tools as well as end effectors for a J-groove inspection or the tool for replica samples.

### Overview

The manipulator can be divided into three major units, the main rail system and the two radial arms. The main rail system is centered in the vessel head stand and comprises a circular rail and surveillance cameras. The radial arms with trolleys and tilting mechanisms can be pushed through the manhole or be put into place before the vessel head is lifted onto the stand.

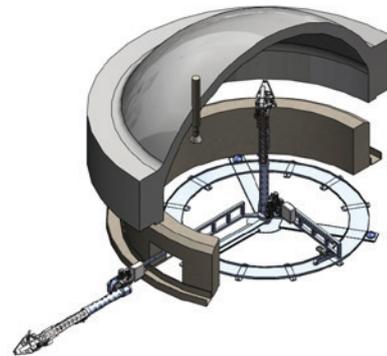
The vertical movement is built as a telescopic mast to minimize the length in vertical position; this allows the manipulator to move freely under the penetrations including the sleeve and possible part lengths.

The end effectors can both be tilted so that they can reach outside of the vessel head. A sliding rail can be used to bring the end effectors outside from under the vessel head. The end effectors can then be serviced in an upright position.

The probes consist of specifically designed thin UT or / and ET probe arrangement. The water used as coupling is collected via a funnel.

The manipulator is controlled from a standardized control system with 6 channels.

### Manipulator Configuration



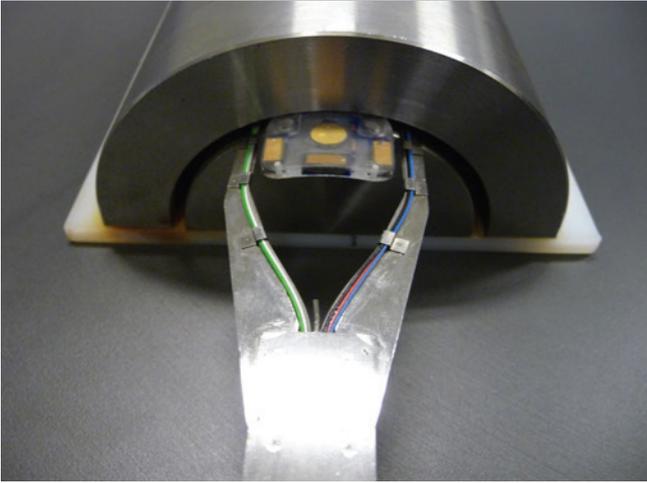
*The manipulator system in service mode*

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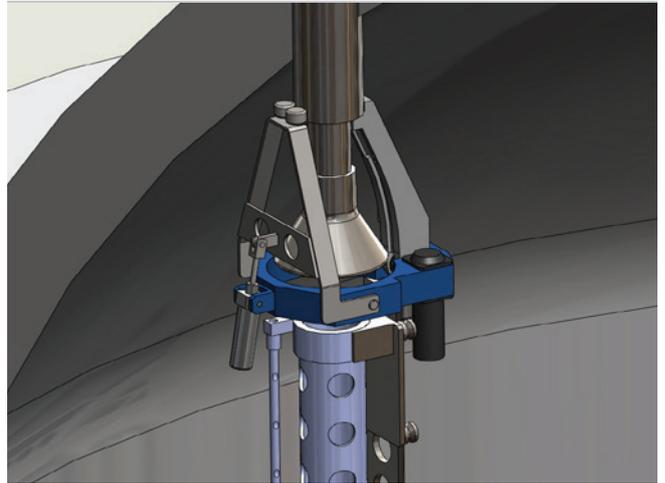
*With reservations for errors and changes.*

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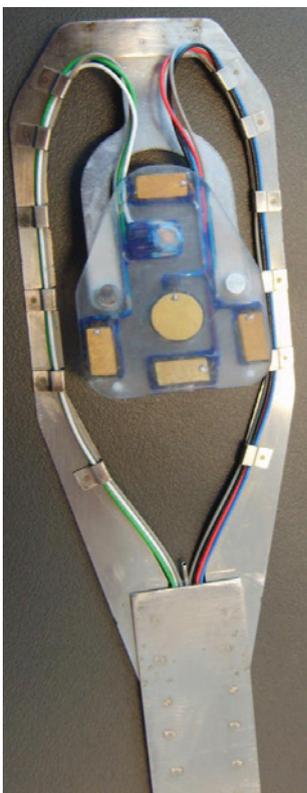
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The end effectors including probes are mounted on the rail system. Each end effector can reach all penetrations and will be equipped with identical probes.



The end effector in scanning position



### Probe for VHP

Four different functions in the same probe!

- > TOFD for circumferential defects PCS 23
- > TOFD for axial defects PCS 18
- > ET coils
- > Pulse Echo zero degree