Efficient reactor vessel inspections reduce required site support
As your ally in reducing in-service inspection durations, Framatome ANP (FANP), an AREVA and Siemens company, developed the new Trans-World System (TWS) remotely operated manipulator system to reduce vessel occupation time (VOT) and minimize site resource requirements for ultrasonic examinations of reactor vessels. The manipulator can support full 10-year, intermediate and follow-up surveillance inspections with minimal disruption of outage activity. In fact, FANP can transport the manipulator to the canal floor through the equipment hatch, or through the personnel hatch. Once on the canal floor, the system requires little or no polar crane time and can be set up quickly in a limited lay-down area.

After assembly and dry system checkout, the manipulator is lowered into the vessel — either with an auxiliary crane or with the building polar crane. The UT system calibration is verified with the on-board calibration confirmation block, and then the scanning is started. High-speed precision robot performance, coupled with an advanced UT acquisition system, enables us to complete the examination for you in only 3.5 – 4.5 days. The innovative manipulator arrangement supports maximum weld coverage while minimizing VOT. Personnel are not required inside the building except to supervise installation and removal, and to remotely change transducers for the inner-radius examinations and safety injection or core-flood-nozzle examinations.

Safe, reliable coverage
We are committed to safety and protecting the resources of our planet. That’s why our responsive teams leave no stone unturned in the highly reliable TWS design. A three-leg base spans the reactor vessel diameter to provide a solid anchor for the six-degree-of-freedom robotic arm. Motor-driven actuators extend and react against the vessel wall with more than 1000 pounds of thrust to virtually eliminate the possibility of the base slipping. Plus, back-up precautions are built right into the system. For example, in the unlikely event of an actuator motor failing in service, a pole-activated release mechanism allows us to quickly remove the system for repair.

The anthropomorphic robotic arm comprises a waist, shoulder, elbow, roll, pitch and yaw precision joints. Shell inspections rely primarily on the waist-joint to sweep the transducers circumferentially around the vessel. The full dexterity of the robotic arm is used to deliver transducers to inspect the nozzle inner radius and the nozzle bores including the deeper pipe-to-safe-end and bi-metallic welds. A uniquely designed base allows the arm to “flip” either above or below the base to support different examination configurations. And the entire weight of the system in water is only 100 pounds (50Kg). It all adds up to data you can trust and efficiency you can count on.
BENEFITS

Speed and Accuracy
- Advanced robot design enables rapid and accurate vessel scans.
- Advances in NDE and robot technology enable the robot to scan more quickly than previous systems, shortening examination schedules.

Reliability
- The building blocks of the TWS are grounded in field-proven designs used by FANP in both the U.S. and Europe.

Reduced site support
- The compact configuration simplifies transport through the personnel hatch.
- The light weight limits reliance on the polar crane.
- A small on-site crew minimizes the TWS burden on plant resources for the reactor vessel examination task.

Modular design and configuration flexibility
- We can rapidly replace modular robotic components in the unlikely event of an actuator motor failure.
- The system’s compact size enables one spare robot to completely replace a unit if necessary, or we can use two robots in parallel to accelerate the examination schedule.

Trans-World experience
The TWS system captures best practices from our extensive world-leading French, German and U.S. reactor vessel examination experience to produce a superior global solution. The TWS tool serves as the basis for examinations in all three regions, increasing resource utilization and enabling us to better serve our clients. For more information on how you can put this unique reactor vessel examination system to work in your plant, contact us today.