



## Case Study: Remote Technologies for Trash Rack Cleaning

**CLIENT:** Electric Power Research Institute (EPRI), Nuclear Maintenance Applications Center (NMAC)

**BACKGROUND:** The traditional approach for inspecting and cleaning submerged cooling water intake structures (CWIS) has been with divers. However, the use of divers presents an occupational hazard. According to the Occupational Safety and Health Administration, there were five diver fatalities in the U.S. at power plants between June 2019 and July 2021. In addition, planning diver tasks requires outages to reduce hazardous conditions resulting in lost generation. There are currently no industries using remote technologies to clean intake structures while the plant is in operation (i.e., at full intake flow). Remote technologies could provide a safe and reliable means to keep trash racks in good operating condition while an intake remains in operation.

**CHALLENGE:** The objectives of this Technology Innovation (TI) project are two-fold: 1) to eliminate human safety risks and 2) to avoid costs associated with plant downtime required for the deployment of skilled diving teams. The challenges include identifying a remote technology that can effectively maneuver and clean in a full-flow (often high-velocity) environment. Remotely operated vehicle (ROV) stability is critical for optimal performance, as is effective monitoring technologies (optical, acoustic) in these often turbid, low light, dynamic conditions.

**APPROACH:** TWB has partnered with Pecten Aquatic (Netherlands) to screen and select qualified remote technology service providers, identify and conduct site visits to two U.S. demonstration sites (one large gas-fired power plant and one nuclear power plant), develop a study plan for future field demo testing, and plan for the future *in-situ* demonstration testing.

*In-situ* testing is designed to answer the following questions:

- Is a remote technology capable of cleaning under full operational flow conditions?
- Are the available cleaning tools effective for removing different types of biofouling?
- Can cleaning with a remote technology be conducted in an acceptable amount of time for a full trash rack?
- Are the logistics (e.g., deployment, operation, retrieval) of using a remote technology tolerable at a given plant?
- Are the costs acceptable for cleaning with a remote technology?

**SOLUTION:** TWB and Pecten Aquatic are working with offshore and diving service providers (SPs) to develop a unique remote platform either by adapting an existing ROV or testing an alternative, novel design. This effort will also evaluate optimal cleaning tools for various types of biofouling. Where required, design changes will be made to provide the industry with a working prototype that can be built by SPs.



Hydrooids – a challenging trash rack biofouler



Trash rack bars fouled with various organisms (courtesy Pecten Aquatic)