Hellan Fluid Systems

Case Study
Location: Southeast US
Customer: Hydro Dam Operator
Application: Cooling Water

Mussel Removal

Challenge

Zebra and Quagga mussels are a significant problem for facilities east of the Mississippi River that utilize surface water. This problem was present at a hydro dam operating in the Southeast United States. Mussel growth on a competitor's strainer in place at the dam was so severe the unit had to be disassembled and manually cleaned (See images 1 and 2 below).


Image 1


Image 2

Solution

The operator of this hydro dam has other dams in which numerous Hellan strainers are in place. Due to two design features, the hydro dams with Hellan strainers are not affected by mussel growth.

First, Hellan strainers utilize a scraping mechanism that removes solids from the strainer's screen surface as the screen rotates during the cleaning cycle. Other manufacturers of similar products rely on the principle that reversing the flow thru the screen is a sufficient way to remove all solids from the screen. In this example, the solids needing to be removed from the screen are mussels. Unlike other various solids the screen catches, mussels are not just resting on the screen surface but tightly adhered to the screen by a bio-chemical bond. The reverse-flow concept has insufficient flow velocity to break the mussel bonding mechanism. To illustrate how strong this bond is, consider Image 3 shown below. This image shows an outboard motor propeller which often runs at a rotational velocity of approximately 3,000 rpm. At this velocity, the flow across the propeller surface is much greater than what can be achieved by reversing the flow across a strainer screen. Even with the increased velocity, the mussels still adhere to the propeller surface.

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Image 3

The secondary design advantage of the Hellan strainer is the high flow velocity through the strainer body. The photo of the competitor's strainer, shown in Image 1, has a reduced flow velocity after the fluid passes through the screen. This is not only a problem because the screen does not remove the mature mussels, but because of the mussel's veligers (offspring) are microscopic and able to pass through strainer screen. The design of the Hellan strainer creates a sufficiently high flow velocity through the strainer thus causing the veligers to be carried away before they can attach to the surfaces within the strainer.

Mussels are currently a significant problem east of the Mississippi River and monitoring shows the problem is moving westward across North America. Strainers are course filters and are not designed to remove microscopic organisms such as veligers. However, the Hellan strainer design optimizes efficiency by both removing the mature mussels and creating a flow velocity that minimizes the likely hood that veligers will attach to the strainer.

Benefits

- Mechanical removal from the screen surface of tightly adherent mature mussels
- Improved efficiency
- Reliable performance
- Optimal run time
- Significantly reduced labor and maintenance costs