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Bar None

SCREENING EQUIPMENT WITH LINKS CAST FROM STAINLESS STEEL ALLOYS INCREASES EFFICIENCY AT A MICHIGAN TREATMENT PLANT

By Scottie Dayton

Maintenance of the 33-year-old bar screens at the Kalamazoo (Mich.) Water Reclamation Plant was stressing the operators. Shear pin failures occurred often, and almost always on weekends.

The worn and corroded frames allowed chain guides to wobble, requiring tension adjustments. When some 1-inch screen rack bars broke, they weren't replaced because of their difficult location and the unit's age. Operators worried that rags slipping through the larger gaps would clog pumps and flood lift stations. With one screen worn out and the other two not likely to continue working, they feared a catastrophe.

To research replacement options, a team that included design engineer Dail Hollopetter, P.E., of Jones & Henry (Toledo, Ohio), operator/maintainer I Gary Ossino, operator/maintainer II Phillip Minich, and operations supervisor Dan Bogema gathered information from trade shows and sales representatives and visited five



The screening system efficiently removes rags and other solid objects.



ABOVE: Operator/maintainer II Phillip Minich shows operator/maintainer apprentice Ed Marnon how to access the chain links on the screening system. RIGHT: The chain inspection port is behind a cover that is easily removed for service.

municipalities with different screening equipment to gain firsthand knowledge from operators.

Their research concluded that the bar screens should be simple and straightforward, fit in the channels, and be made of stainless steel to resist corrosion. AMWELL – A Division of McNish Corporation won the bid with its DuraMax bar screen. Installation of two units by local contractor L.D. Docs Associates took less than two months and did not disrupt plant functions.

DIFFICULT CONDITIONS

The 54 mgd (design) activated sludge plant handles 25 mgd on average from more than 180,000 residents within the county. The sewers, with 60 lift stations, cover 350 square miles and include 72-inch interceptors delivering 300 gallons per second to the headworks.

"Channels 1 and 2 are on the first wet well, and Channels 3 and 4 are on the second wet well," says plant engineer Larry Fischer. "The screen in Number 1 doesn't function. We replaced the screens in Channels 2 and 3. Channel 4 is still functional and can be used for backup."

The original cast iron chain-and-rake screens were 6 feet wide and 31 feet tall from the bottom of the 10-foot-deep channel to the upper operating floor. The bars were in the bottom 8 feet. Although the area was not classified as a confined space, workers carried gas detectors and followed protocol for entry that included activating exhaust fans. Changing a shear pin took one to two hours.

Although AMWELL was not the lowest bidder, plant operators saw the cast, hardened stainless steel chain design as the best product for the purpose. Another consideration was that the chain and sprockets, made by Environmental Resources, have a 10-year war-



rancy. "That's extensive for a piece of mechanical equipment used in a corrosive atmosphere," says Fischer.

VAST IMPROVEMENT

The screens, built of 1/4-inch stainless steel frames, have jam-resistant chain guides and bar racks with 1-inch openings. Curved sidebars on the links reduce wear on the headshaft sprockets and increase load-carrying capacity. Tee-shaped full-length lateral ribs reinforce the chain sidebars. Rotating chain pins (inserted by hand from either side of the link) and pin bosses evenly distribute the load and wear throughout the joint contact surfaces.

"The screens are wonderful and have worked out even better than anticipated."

LARRY FISCHER

Once the screens were installed, a level transducer initiated operation, cycling for two minutes every 25 minutes. "The screens and conveyor run five minutes an hour versus 60 minutes an hour for the old equipment," says Fischer. "We haven't run the new system long enough to quantify our energy savings, but it has to be significant."

If the screen binds, an electronic shaft power monitor stops the motor before pins can shear, and the operator receives a screen fault alarm. From the upper operating floor, the worker turns a switch, reversing the screen for a short distance to dislodge debris, and then turns the switch back to forward to engage the tines and continue cleaning. The operator rarely needs to enter the channel area.

Another worker-friendly feature is that the gearbox and motor



The screens have jam-resistant chain guides and bar racks with 1-inch openings.

are positioned 6 feet off the main operating floor. "The old drive equipment was 12 feet overhead," says Fischer. "We needed a ladder to reach it and a crane to lift the motors. Now we can unbolt them or check the oil from the floor. The screens are wonderful and have worked out even better than anticipated." **tpo**

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