

CASE NO. 07

APPLICATION: *Boiler Systems*

Alaskan Salmon Hatcheries

LOCATION(S): _____

Valdez Hatchery, Valdez AK.

Cumy Creek Hatchery, P.W.S.

Wally Norburg Eastern Island AK.

A.F.K. Hatchery Evans Island AK.

Heat-Timer Controls Provide Close Temperature Tolerances Required By Alaskan Salmon Hatcheries

PROBLEM: It was a matter of highly precise temperature control. Prince William Aquaculture, a non-profit salmon ranch in Alaska, needed a boiler system that could maintain extremely accurate temperature control over the egg wash water in 4 hatcheries along the Prince William Sound.

Aquaculture wanted to do more than simply maintain ideal conditions for raising salmon. The organization, which is sponsored by the Alaskan commercial fishing industry, needed to be able to distinguish between salmon hatched in one hatchery from another. This allows Aquaculture to track the survival rate and life cycle path of salmon from its individual hatcheries. Elevating the temperature of the egg wash water during the incubation period results in certain, unmistakable rings around the fish's Otolith (ear) bone. The width and darkness of these rings vary according to the temperature of water and the length of time the temperature is maintained.

To achieve a clear distinction between fish from the various hatcheries, the boiler system would have to maintain a ± 2 degree tolerance.

According to Russ Bradley of Aquaculture, both state and private research shows that this is by far the most effective method for marking the fish: The challenge was building a system that could maintain the close temperature tolerances. There were other critical factors, as well:

.Because the hatcheries were so remote (3 of the 4 were accessible only by boat or plane) the units had to be built elsewhere and then transported to the site. Therefore they had to be mobile, *and* containerized for protection against the elements.

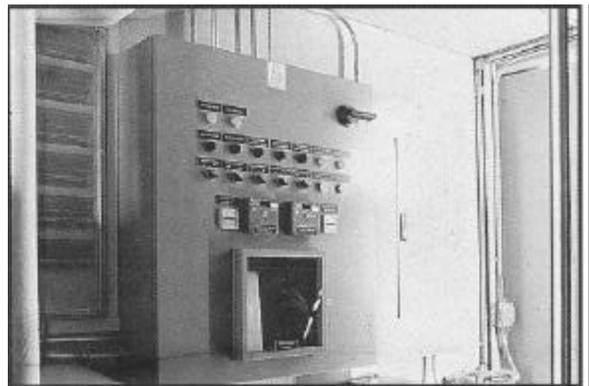
.The controls for these systems had to be easy to operate. Since the hatcheries were remote, assistance would not be readily available, so the on-site operators had to be comfortable with the system.

.Finally, the systems had to be built quickly. Fish marking takes place between the months of August and December, which left only a few short months for the systems to be designed and built.

According to Mr. Bradley, Aquaculture knew what they needed in terms of GPM and temperature. The next step was finding the right equipment and someone who could design and build the system.

SOLUTION: Aquaculture contacted KCM, a design firm in Seattle, WA, to design the systems. Based on Aquaculture's specifications, KCM developed a set of specifications for 4 boiler systems (one per hatchery) and provided a general layout calling for two boilers, a single plate and frame heat exchanger, a temperature controller and mixing valve. Leaving no room for error, KCM specified that the controller and mixing valve be able to maintain set temperatures to within ± 0.5 degree F accuracy.

According to Ted Day of Ramset Mechanical Corp., the toughest part of building the systems was fitting all of the



Heat-Timer control installation maintains hatchery water temperature.

equipment into the 8' x 20' shipping containers which would permanently house the equipment.

"We ended up redesigning the system 10 or 12 times before the final design was reached," he said.

Ramset relied on Proctor Sales to design the control system which utilized a number of Heat- Timer controls, including:

.A Boiler Modulation and Sequencing Control (MOD-4) to regulate the two full modulation boilers.

.A Change Over Control (COC) which is wired to a high and low temperature alarm-

.A Modulation Control (MCF) to control a Heat- Timer 4- way mixing valve.

Each of these controls are integrated into a master control panel. Relays throughout the system send data to the main panel, which in turn operates the boilers and mixing valve to maintain ~ constant boiler loop temperature.

How The System Works

Boiler water is used to heat egg wash (river) water via a plate & frame heat exchanger.

Central to the boiler system is the Heat-Timer 4-way mixing valve which compensates for variances in boiler loop temperature. The combined water from both boilers enters the 4-way mixing valve. The 4-way valve modulates in response to various temperature sensors, mixing return water from the heat exchanger and boiler water to obtain the required temperature rise in the egg wash water.

Simple, Accurate & Affordable

While the system appears quite complex, Aquaculture was pleasantly surprised at how simple it was to operate. Ted Day, who provided the on-site training for the controls, said that after two sessions the on-site personnel were completely comfortable with operating the controls. He credits Proctor Sales and Heat-Timer for providing such user friendly controls.

"Whoever designed the controls put a lot of thought and imagination into them," remarked Mr. Day. "Of all the control panels I've ever worked with, these were the slickest."

With the first heating system successfully completed, Russ Bradley was equally complimentary of the packaged systems. "I was really pleased with the system and the support we received from Proctor Sales and Ramset Mechanical," he said.

Thanks to the affordability of the Heat- Timer controls, Aquaculture was able to purchase back-up equipment for the system to keep on-site. This is extra insurance against unanticipated shut-downs. Since the hatcheries are so remote, waiting for a replacement item could greatly interfere with the marking process.

Ultimately, the boiler systems will provide Aquaculture with one of the most accurate and affordable tracking systems known to the Alaskan fishing industry. According to Mr. Bradley, the marking and sampling process will yield a tremendous amount of data to various organizations with a vested interest in the production of salmon, including hatcheries, fish & game authorities, commercial fisheries, and more. Studies assist these organizations not only in the production and replenishing of salmon, but improving their health and quality;



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