



# CASE STUDY: Cordova Electric Cooperative, Inc.



*"Cordova Electric highly recommends Canary Labs trending software as a low-cost, high value, user-friendly solution for system wide data storage and analysis."*

- Clay Koplín, PE  
Chief Executive Officer



## Configuration Overview:

- Trend Historian
- Trend Link

## Canary Labs Integration:

- Wonderware InTouch

## Company Overview

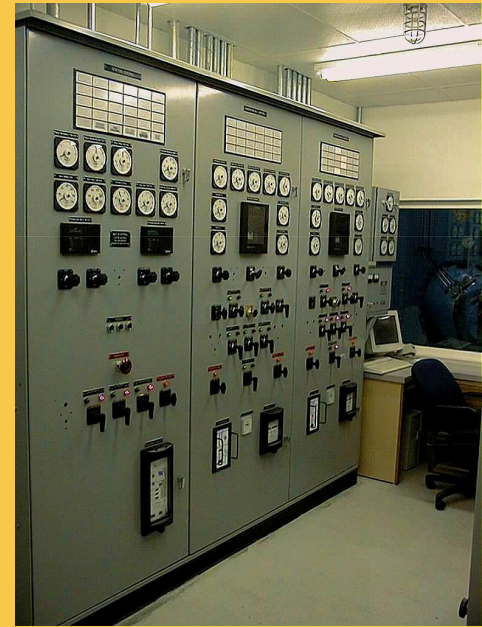
Cordova Electric Cooperative is the sole provider of electricity to approximately 1600 customers in the coastal community of Cordova, Alaska. Cordova is flanked on three sides by rugged mountain ranges and by the Gulf of Alaska. Fishing is the basis of Cordova's economy. Cordova is accessible only by air or by sea. There is no power grid in much of rural Alaska, so if the local power system goes down, there is no electricity. It is therefore critical to quickly find and resolve any problems since these rural Alaskan villages are dependent solely on the local power system.

## Background

Cordova Electric produces 60% of Cordova's electricity from the Power Creek Hydroelectric Project, a Green-E certified, low impact, run-of-the-river hydroelectric project. The project uses an inflatable dam that can be raised and lowered as needed. The project began revenue service in January 2001 and is remotely operated, and automated to run unsupervised. The project directly offsets the use of diesel fuel to generate electricity.

Power Creek uses Trend Historian and Trend Link from Canary Labs with Wonderware's InTouch HMI package. In February 2004, CEC began trending approximately 500 data tags. With this data, CEC is able to mine seven years of continuous data for information such as interior and exterior plant temperatures, turbine bearing temperatures, generator winding temperatures, power output and system frequency data, the status of electrical distribution system feeders and plant station service voltages, dam intake structure water elevations, and penstock pressures.

CEC estimates that the \$750,000 cost of automating two hydroelectric plants



was recovered within three years. Canary Labs trending software is a key component of the savings derived from the automated system. Examples of cost savings include access to raw data for engineering studies and evaluations, preventative maintenance, and emergency maintenance.

## Situation: Bearing High Temperature Alarm

In August 2009, during a peak system load on a relatively warm day, the automation system indicated a high main bearing temperature on a hydroelectric turbine. The cost of removing a hydro turbine from service is \$675 per hour in fuel cost, plus troubleshooting time and overtime. This is because diesel fuel must be used to run a diesel turbine while the hydro turbine is not generating electricity. A standard approach to this problem would have been to take the unit offline, remove cover plates, inspect the bearing, measure tolerances, change lube oil and filters, restart, test, and monitor the unit temperature. This would have resulted in over 24 hours of downtime.

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Looking back at seven years of bearing temperature data, there was no incremental temperature increase to indicate an impending failure. Overlaying the temperature trend with a hydro turbine loading trend showed that there was a direct correlation between high bearing temperature and high hydro unit load. The plant interior temperature trend showed another direct correlation to bearing temperature. By evaluating these trends side-by-side, it showed that the relatively high ambient temperature and the high loading on the unit were consistent with a higher bearing temperature in normal operation.

However in this situation the bearing temperature was too high, and there were some instances where higher loading was resulting in a lower bearing temperature. Trend Link was used to zoom into a one hour interval. It was found that in addition to the steady rise in bearing temperature, there were periodic spikes. The plant operator suggested that the bearing lube oil sump cooling fan could be failing. The operator drove to the plant and witnessed the fan operating sporadically, and quickly isolated the problem to carbon and corrosion on the contacts. He immediately shifted the fan control to the adjacent dual contacts. The alarms cleared and the bearing temperature immediately fell to an acceptable operating temperature. The entire evaluation, isolation, and correction of the alarm took less than an hour, and the hydroelectric turbine did not have to be taken out of service. The estimated savings of this one event was \$20,000 in diesel fuel and labor.

### Situation: Excess Hydro Analysis

In October of 2010, CEC sought a method to determine the amount of excess hydro that was running over the crest of the inflatable rubber dam. This excess water represents the opportunity to increase sales, provide a low cost incentive rate, and spread fixed costs to lower the price of all electricity in the community. It was found that the data stored by Canary Labs included measurements for the elevation of the dam crest and the pond level. The differential represents the vertical depth of the water running over the dam. By using weir geometry, average flow rates, and correlating this information to kilowatt hour production, a rating chart was developed. Excess hydroelectric power production was calculated and profiled on an annual basis. Four years of data was used and only one man day of work was required to compile and calculate the data needed to produce the graphs. The cost of the study was \$1,000. This saved CEC \$19,000 when compared to the cost of hiring a hydraulic engineer to perform a theoretical analysis based upon historic stream flows and power use curves.

### Summary

There are many day to day applications of the trending software including analysis of power use patterns in the community, loads on portions of the system before, during, and after outages, and system studies of power factor, voltage drop, load balance, and economic dispatch of units.

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