



Case Study

Seattle Steam Optimizes Boiler Control with FOUNDATION Fieldbus

District heating company realizes advantages of reliable fieldbus control solution

Seattle Steam is a district heating company located in Seattle, Washington. Founded in the late 1800s, the company maintains 18 miles of pipe buried under the streets of downtown Seattle in a one square mile area. Customers purchase steam for heating buildings and water, and in the case of hospitals, for use in sterilization processes.

Although Seattle Steam's steam generating operation had been modernized several times over its history, the company had not upgraded its plant automation equipment in many years. Management decided that a new boiler control system was in order. The project would involve replacing outdated pneumatic controls that were increasingly difficult for plant personnel to maintain.

■ Background

Because of the lengthy period between upgrades, Seattle Steam had no preconceived notions about process automation technology. Control system selection began with a clean sheet of paper. However, plant engineers were most concerned about equipment obsolescence; as a small company, Seattle Steam could not afford to replace its control system every 5-10 years, and thus required a solution able to evolve with new technology. The company also viewed reliability as a key criterion.

After considering alternative approaches, Seattle Steam decided upon a FOUNDATION™ Fieldbus-based control system. At the heart of the system was a powerful, multifunction hardware component that functions as an interface, linking device, bridge, controller, gateway, fieldbus power supply, and distributed I/O subsystem.

The multi-function hardware component, serving as a universal bridge, integrates all of the hardware and software needed to manage, monitor, control, maintain and operate the steam plant boilers. Due to the use of open standards such as FOUNDATION Fieldbus and OPC, the unit provides tight integration of intelligent devices supplied by various instrumentation vendors, as well as the plant's human-machine interface (HMI) software.

■ Selecting FOUNDATION Technology

For industrial organizations like Seattle Steam, FOUNDATION Fieldbus is a proven solution for improving operational effectiveness, reducing costs and ensuring safety. It is also the right choice for a future driven by the Industrial Internet of Things (IIoT) and a connected enterprise.

FOUNDATION Fieldbus allows industrial organizations to unlock the full capabilities of their existing assets. By providing the means to leverage immense amounts of data generated by modern automation systems, the potential uses and benefits are numerous. They range from enhanced data collection and improved remote monitoring, diagnostics and asset management, to reduced configuration and commissioning effort.

FOUNDATION Fieldbus provides an all-digital communication infrastructure for process automation, with powerful multivariable measurement capabilities, robust device diagnostics, and the ability to integrate wireless devices across multiple networks. The block structure of FOUNDATION Fieldbus is unique, enabling true distributed functionality, improved data management, and alarm and alert management.

With FOUNDATION technology, multiple devices — each with multiple I/O signals — can share the same bus. Fieldbus-based control systems employ two-wire twisted pair cable and provide intrinsically safe or non-incendive device power suitable for all hazardous areas. Unrestricted access to field device intelligence enables centralized configuration/setup and diagnostics for all field instruments, including discrete sensors and actuators. This solution also supports temporary masters such as handheld field communicators, laptops/tablets, and documenting calibrators.

Unlike other digital architectures, FOUNDATION Fieldbus was designed from the ground up to enable control-in-the-field (CIF) strategies across the plant. This means that during a host system failure, field instruments can communicate directly with one another to maintain continued safe operations. The technology includes a number of physical layers (the medium that the signal communicates through) and a rich software platform that allows for the over 1,000 registered products to interoperate between various manufacturers of devices and control systems — offering end users the flexibility to choose best-in-class solutions for their application.

FOUNDATION Fieldbus also supports the NAMUR NE107 recommendations for managing data from intelligent instrumentation. This ensures diagnostic data is managed effectively, and you only see the information you need to see, when you need it.

■ **Reliable and Flexible Control Solution**

Process plants all across the globe choose FOUNDATION Fieldbus as an end-to-end digital communication standard. Whether strict determinism, inherent disturbance rejection, or a broad base of registered devices matters most, FOUNDATION Fieldbus enables best-in-class solutions for fully digital plant architectures.

FOUNDATION H1 (31.25 kbit/s) technology is designed specifically for field-level interface and device integration within the process plant environment. It is the foundation upon which Information-driven systems offering increased connectivity, real-time data, and advanced analytics can deliver better performance and enhance competitive advantages—not only in the plant, but across the enterprise and out to its value chain.

FOUNDATION H1 is an interoperable, bi-directional, digital, serial, publisher-subscriber communications network, which is suitable for use in hazardous and potentially explosive areas (Ex zones 0 and 1), as well as intrinsic safety (IS) applications. Each H1 segment supports a length of 1,900 meters and connects up to 32 field devices, depending on the individual environment. These limits can be extended using bridges.

The FOUNDATION H1 solution enables field instruments and other devices to execute control functions, thus reducing the load on plant computers and workstations. Since the H1 network is digital, I/O conversion subsystems are eliminated.

■ Project Results

Seattle Steam was able to configure a simple, reliable, fieldbus-based control system without the complexity and cost associated with a legacy DCS. A single hardware module implements four FOUNDATION Fieldbus H1 ports, and Ethernet and serial Modbus ports directly on the controller without the need for separate interface modules. As such, the unit requires a fraction of the space of solutions using individual modules, and is easier to install, maintain and expand.

Using FOUNDATION technology, field devices can handle continuous regulatory control for the boiler process. This approach restores single-loop integrity and minimizes the chance of introducing errors into the process. Full redundancy and fault isolation also ensure increased safety and uninterrupted operation. For example, plant operators can turn off their computers, and as long as power is maintained to the fieldbus system, the boilers remain stable.

Most importantly, Seattle Steam realized significant hardware and installation cost savings by implementing a FOUNDATION Fieldbus-based control system. Compared to traditional single-loop controllers, the fieldbus system reduced input/output (I/O) requirements and the labor involved in wiring field instruments.

■ Conclusion

With a FOUNDATION Fieldbus control solution, Seattle Steam has a secure, affordable path forward to new technology. The fieldbus-based system has performed reliably during years of continuous operation. That will help the company keep its customers warm well into the future!