

Step change in boiler house control

Freelance DCS helped to develop the next generation boiler control and monitoring for Byworth Boilers



Byworth Boilers, Keighley, UK, manufactures industrial boilers which include steam boilers, hot water boilers and accessories. Byworth balances the best of British design with technological innovation which can readily be seen in their new Unity Intelligent Boiler House Control system. Unity takes a fresh look at boiler house control and combined this with modern automation technology to produce increased reliability of steam and hot water supply along with energy saving. Byworth selected ABB's Freelance process control system to be at the core of the development.

Since 1968, Byworth has built a world-wide reputation as a producer of performance boilers, combining high-quality manufacturing processes with a passion for exploring new ideas and technologies largely ignored by longer established competitors. As a result, not only are their boilers more efficient, cost-effective and safer than any others – they're also more future-proof, making them the preferred choice of an increasing number of customers both in the UK and internationally.

Improved boiler control

The vision of improved boiler control was derived from previous experience by key personnel in the Oil & Gas sector and the inherent boiler know-how from within the company. It was realized that a boiler should be seen as a complex process which was better controlled as a single system rather than depending upon discrete stand alone controllers for each loop (such as the maintenance of water level). The single system approach allowed all critical loops and discrete measurements to be combined to produce a holistic system with cross coupled and feed forward actions. The result produces optimized boiler control at all times, regardless of external variables and disturbances. In addition to adopting a single system approach the company also invested in improved sensor technology for the boiler itself as this was critical to the quality of control.



Towards a solution

Byworth had to find the best route to this vision, with choices in control hardware, functional specification, software design and initial commissioning. Several technologies were evaluated which resulted in the ABB Freelance system being selected because of its advanced functionality, DCS structure of all-in-one database, compact size, ease of programming and change management, and also cost. After investigating channels for system implementation of their own functional design they made the decision that it would be more efficient to undertake this task in-house where their considerable boiler expertise could readily be deployed within the solution.

The system was developed by Mr Jason Atkinson of Byworth who said, "The week long ABB training course gave me the underpinning knowledge to commence on an initial six month development program". Jason started with Byworth as an apprentice and has obtained a great understanding of boiler control techniques, from his time on the service team he gained new insight of the benefits that a modern control and monitoring system can provide for Byworth service and also for the end user customer satisfaction.

Technological advantages

The ABB Freelance system is field proven in many industries and has all the benefits that DCS architecture delivers: a primary aspect of this architecture being the single database for control and graphical display, which simply makes development much more efficient than fragmented PLC / SCADA solutions. Multiple Freelance controllers (usually one per boiler) allow ready and total integration of multi-boiler systems into a single boiler house system; this is undertaken efficiently by duplication of ABB Freelance system code and slight changes owing to any particular boiler variation. No master supervisory controller is needed in such applications as the ABB network

connection between controllers provides a single system view from any control position.

Byworth UNITY – the rationale

UNITY offers high levels of visibility and fingertip control of every aspect of boiler house technology, explaining the thought processes that drove its development, Jason Atkinson commented, "Current integrated systems are simply not using the data they collect in an effective manner. With UNITY, we've thought about how all of these discrete signals can be brought together and made to work in a user-friendly system that is far greater than the sum of its parts. What we're offering is a boiler house that makes intelligent decisions based on multiple pieces of information."

From a central user interface, a built-in touch screen, or remotely via PC, Tablet or Smartphone, UNITY operators can view processed boiler house data and trends relating to numerous values including:

- Boiler and Manifold Pressures
- Boiler Water Levels and Conductivity
- Hotwell Levels and Temperature
- Blowdown Temperature
- Flue Temperature and Gas Analysis
- Plus several more ancillary values depending upon boiler configuration

All alarms and tests conducted are logged and can be exported to a network printer if required; whilst a straightforward "traffic light" warning system keeps users up-to-date with any changes in plant conditions and draws focus to areas requiring attention or adjustment. This comprehensive, "joined up" approach to the management of multiple processes gives UNITY its unique advantage over other control systems, which typically employ third party applications to control each aspect of the boiler house.

The ABB system has allowed us to develop the next generation of boiler control and monitoring, which monitors and improves energy efficiency, provides a robust solution to assist with plant uptime, and remote access to ensure high service levels.

Byworth Boilers Ltd
<http://www.byworth.co.uk>

Remote access

Several options are available by which UNITY can be connected remotely; either by LAN or WAN connection, or a more recent development making 3G connectivity possible. Thus UNITY can be readily integrated into any M2M (Machine to Machine) architecture. The benefit of this is that it results in a more meaningful service visit through predictive maintenance and pre-accessing problems as they develop, avoiding costly unplanned downtime and also energy expensive abnormal running conditions.

The Freelance standard UNITY system comprises:

Freelance version 2013: PM 783F, Central Processing Unit (2 MB); 2 off DC 732F, Digital Input / Output Module; 1 off AI 723F, Analog Input Module; 1 off AX 722F, Analog Input / Output Module along with Control Builder F Professional (including DigiVis – process visualization). In addition a touch panel PC is used for local display and operation. Jason reported that the following Freelance functionality was of particular relevance to UNITY in both development and runtime phases: ease of use, scalability, reliability and extensive features.

Summary

Mr Adrian Rhodes, Technical Director, Byworth Boilers, “The ABB system has allowed us to develop the next generation of boiler control and monitoring, which monitors and improves energy efficiency, provides a robust solution to assist with plant uptime, and remote access to ensure high service levels.”

Byworth has taken a root and branch approach in upgrading its boiler house control solution. The outcome is UNITY which offers enhanced control and is also information-rich, which assists all stakeholders in developing key insight into the behaviour of their critical boiler house assets at all times, improving energy efficiency and improving availability.



Jason demonstrates UNITY visualization - using ABB Freelance DigiVis



The UNITY control station



The Freelance controller AC 700F with S700 direct I/O



Jason, Adrian and ABB's Anders Forsberg
Byworth Boilers UNITY system shown
at the Foodex 2014 event NEC Birmingham UK

For more information please contact us:

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