

# New controller excels in critical boiler control application



Keith Carter adjusts the setpoint of a Siemens Moore draft controller at Boiler No. 2 in the Wilson Sporting Goods plant in Humboldt, Tennessee.

An updated boiler control system gets high marks for solving a serious problem of erratic steam supply in the Humboldt, Tenn., plant of Wilson Sporting Goods Co., a subsidiary of Amer Group (Helsinki, Finland). This plant is devoted exclusively to the production of premium golf balls for all sales worldwide. Each year the product line has been refined with high-tech designs, such as the Smart-Core models, that place increasing demands on tight production tolerances.

The most critical need for a reliable steam supply, at a tightly controlled pressure, is in the molding presses for the golf balls.

Held closely at a value in the range of 150 psig, this pressure determines the exact temperature in the molds and is extremely important to the quality of the golf balls.

Steam is produced by three B&W watertube boilers, which feed into a common header carrying the steam to the manufacturing area. In addition to the prime use in the molding operation, steam also has many other applications in the plant — including humidification in paint rooms where control of temperature and humidity are very important. It is also used for space heating in cooler weather.

***Wilson Sporting Goods uses Procidia ICS to eliminate erratic steam supply at their Humboldt Tennessee Plant.***

Two of the boilers, identified as No. 1 and No. 2, have a capacity of 10,000 lb/hr; they were originally coal-fired but were later converted to fire natural gas. A third 30,000 lb/hr gas-fired boiler was added some 10 years ago. The vintage controls performed adequately in their day, but, as production capacity increased, sudden swings in steam needs became commonplace. The independent, uncoordinated boilers became less and less capable of responding properly to these needs. This was especially true in holding steam header pressure within the required narrow band at the molding presses.

Some of the consequences of poor boiler control can be costly. Violent swings make it difficult to maintain proper drum level and are hard on boiler tubes. Newer No. 3 boiler even had premature tube failures due to insufficient feedwater supply. The cost of tube replacement was some \$150,000, and of course the boiler had to be shutdown for a period of weeks.



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Any condition that causes lack of steam at the proper temperature can hamper the molding operation, and that is of major concern to everyone in the plant. Not only can this be a major expense due to product rejects but also it can cause a missed customer delivery date, which with a major customer can result in a penalty as high as \$25,000.

Faced with increasing problems with the boiler operation, Keith A. Carter, Senior Facility Engineer at the Humboldt plant, called on Thermal Economy, Inc. (Cordova, Tenn.) to analyze the problem and provide a solution. Thermal Economy specializes in combustion equipment as well as combustion control systems and is a system integrator for Siemens Moore Process Automation, Inc. (Spring House, Pa.). Bruce Darling, an engineer with Thermal, is well versed in boiler controls and also trained in the application of Siemens Moore's new Procidia™ Control System which was introduced at ISA/99 as being directed at the unit control market.

At the heart of the solution that Darling came up with is a Procidia controller, tradenamed i|pac™ — a compact hybrid controller that can provide analog and discrete I/O as well as PID control of multiple control loops. The system Darling designed and engineered resulted in smooth but highly responsive control of steam header pressure, under widely varying plant conditions. Wild swings in the operation of individual boiler ceased.

What's more, the new controller has the capability of gathering and

storing data on steam and gas flow rates, boiler "on-off" status, and steam header pressure. These values can be picked up in real-time by a PC and displayed graphically, including totalized values for any desired production period. Once a day, an operator performs a "print screen" to capture the 24-hour totalized steam and gas flows.

An outstanding feature of the i|pac controller is its ability to continue all its functions even if the computer crashes. A traditional controller faceplate connected to the i|pac controller is mounted on the outside of the control enclosure. It offers full configuration and change capabilities for the control system on the plant floor.

The operators have complete control of all three boilers from the faceplate. In addition, a graphic faceplate display for the Plant Master and Boiler Master control loops permits these same capabilities from the PC screen. Thus, all boiler control functions have been centralized in one location near the boilers (Boiler 3 is some distance away from the other two boilers).

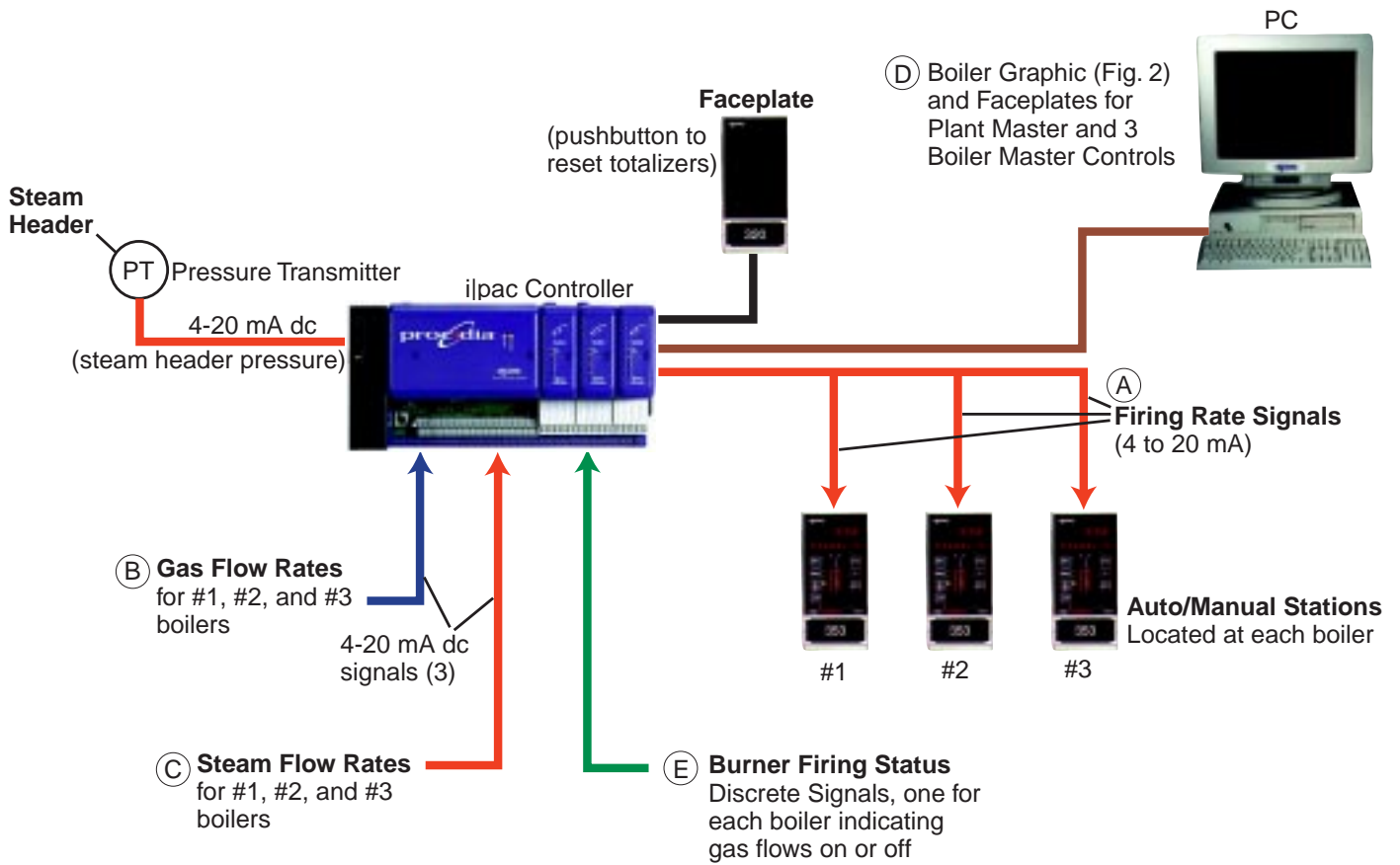
"In my 17 years as an engineer," states Keith Carter, "out of all the money I've spent for plant equipment, I can safely say that this new boiler control system has been one of the best investments I've ever made. What used to be one of my biggest headaches has been solved to near perfection. Not only does the system provide smooth, coordinated control of the three boilers, but it's also giving me readily available boiler operating data that can help us pin down costs, such as natural gas consumption."

Carter hopes that natural gas usage will be reduced by as much as 15%, which would amount to savings of thousands of dollars per month. However, he emphasizes that, welcome as such savings may be, the objective of the boiler control update was not to save money, but to solve a troublesome production problem.

In the offing, already funded, is the addition of an Ethernet connection from the existing PC in the boiler room to another PC in Carter's office some distance away. Thus, he can view everything that the local PC has gathered from the i|pac controller, especially the graphic display for the three boilers. He can also remotely make use of the Plant Master and Boiler Master faceplate display, e.g., for adjusting setpoints.

In the future, Carter can also make use of the Internet for the remote monitoring and control as described above. All he need do is add a plug-in, Internet web server to the i|pac controller. Without the need to install HMI software in the PC, he could then use a standard web browser to access all the data gathered in the i|pac. He could do that at any location, even with a laptop.

Looking further to the future, since a number of i|pac controllers (and Siemens Moore 353 single-loop controllers as well) can be networked together, Wilson can expand the use if these controllers for other plant functions outside the boiler room while retaining the existing PCs for operator interface. The controllers have a built-in capability to do this without the need to standardize on a fieldbus protocol.



**Schematic of control system for the three boilers**

*Not shown on the diagrams, each of the boilers has automatic control of induced draft (I.D.) fans. Boilers No. 1 and 2 use a single-loop controller (Siemens Moore Model 353) to receive draft measurements from a pressure transmitter and regulate an I.D fan motor via a variable speed drive. Boiler No. 3 uses the control signal to its gas flow control valve to operate dampers in the air draft duct*