

## INDUSTRIAL TECHNOLOGY

# Advanced Process Control (APC) Paves the Way to Optimizing Steam Header Performance



By Phil Russell

**Apperture Solutions has the tools and expertise to address complex problems—enabling customers to realize significant savings and enjoy more streamlined operations.**

A leading paper company's steam demand was experiencing sudden drops, such as during an unexpected equipment shutdown, causing pressure swings in the main header, leading to plant-wide operational issues. Their high-pressure steam header manages two double-extraction steam turbine-generators and supplies three additional headers at varying pressures, delivering critical steam across the facility. To resolve these challenges, the customer wanted to optimize production using Advanced Process Control technology.

Steam Header Advanced Process Control utilizes sophisticated control algorithms to optimize steam header pressure and overall steam network performance. APC systems typically employ Model Predictive Control (MPC) to handle complex interactions and large number of process constraints—like boiler loads, turbine loads, and pressure reducing valves—to maintain stable steam pressure and minimize steam venting.



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## MPC Eases Complexity in Steam Header Pressure

Power plant control is challenging due to the mix of fast and slow process dynamics—header pressure changes slowly, while turbines and valves respond in seconds. To manage this, we combine Model Predictive Control (MPC) with traditional PID loops. An advanced algorithm continuously calculates the most efficient operating targets for equipment, energy, and fuel, sending those targets to the control system for quick, precise adjustments. This approach improves efficiency, reduces the need for wide safety margins, and enhances resilience. During disturbances, the system temporarily shifts focus from optimization to stabilization, then automatically re-optimizes once conditions return to normal.

To ensure continued results, we actively maintain the system every six months to fine-tune the model based on metrics and operator feedback.

***“Just like with cruise control on your car, our operators don’t want to take it out of APC mode (nor do they have to), because it allows them to ride smoothly through the minor disruptions of the day.”***

**-Powerhouse Area Manager**



**\$600K per year savings realized.** This

customer has been able to reduce the boiler minimum to a level much closer to their desired limit because of reduced variability and therefore significantly lowering fuel costs.



**Improved quality of the condensate** that comes back to the boiler.



Better ability to respond to disturbances significantly **reduces lost steam vented to the atmosphere.**