

Boiler Feed Applications and Case Study

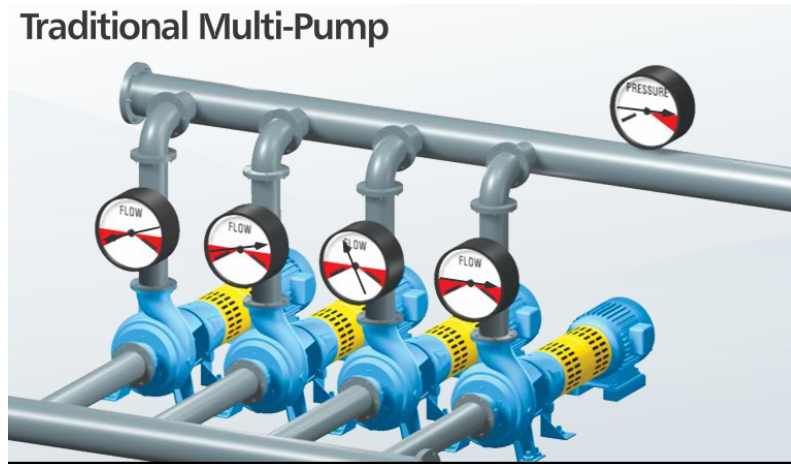
Boilers are designed to supply steam for heating purposes. The boiler is a pressurized vessel that contains superheated water. It is up to the boiler feed pump to maintain a set level in the boiler(s) and the demand is expected to be highly variable.

Challenge #1 – Highly variable demand with a need for multiple pumps –Multi-pump systems provide a cost-effective and flexible solution for highly variable flow demand boiler feed applications. With this approach, low demands can be managed by a single pump, and as demand increases, one or more additional pumps can be operated.

Control of these systems is one of the most challenging tasks pump users face, and unfortunately many operators choose to run all of their pumps, all of the time, rather than face the potential of missing process demands. As a result, many multi-pump systems have pumps that run outside of their recommended minimum or maximum flows, and ultimately leading to reduced pump reliability.

Traditional Multi-Pump

Traditional Multi-pump applications often run all of the pumps all of the time to avoid process conditions. Variations in pump performance can result in pumps running at shutoff and run-out flow.



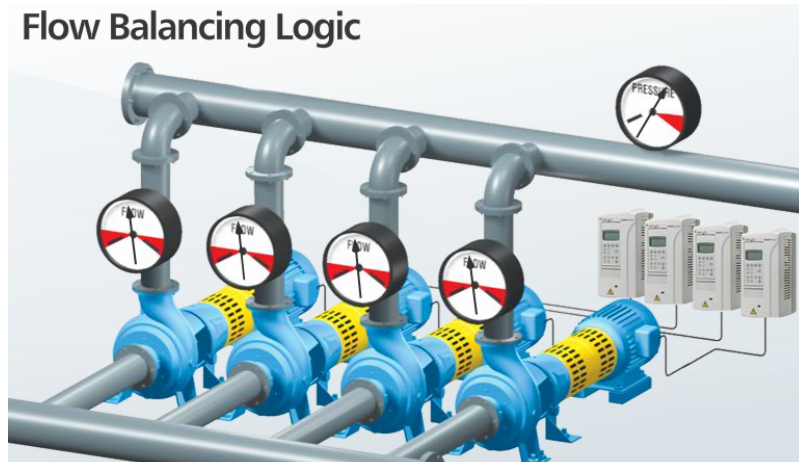
PumpSmart offers a pre-engineered and documented multi-pump package that manages all of the operating details, including:

- Determining how many pumps should operate to meet the process demand.
- Evenly distributing the load to each pump being operated.
- Automatically sequencing pump operation based on the hours of operation for each pump.

One of PumpSmarts' most unique features is its ability to balance loads between pumps, rather than simply pump speed. Synchronization of pump speed is a common approach to multi-pump control; however it fails to account for differences in pump wear, dimensional tolerances, and process inlet conditions. Balancing flow rates of each pump results in improved pump reliability and process control. When these conditions are not accounted for, the resulting pump flows can vary greatly.

Flow Balancing Logic

Pump-Smart is designed to balance the flow rates of each pump



Challenge #2 – How to avoid keeping the bypass on at all times – When system demand is low a bypass line assures the boiler feed pump is not run a low flow or shutoff. Because boiler feed pump curves are generally flat a constant bypass flow rate will occur even when the boiler demand increases. This is a major source of system inefficiency.

- **PumpSmart Solution for bypass control – The flow rate provided by** PumpSmart ability to derive a pump's flow rate can be incorporated into the logic of a PLC to determine when a bypass valve should be opened and closed. This will have a profound positive impact on system efficiency.

Case Study: Boiler feed

System Challenge: An industrial customer was experiencing pump failures on a multi-pump boiler feed application. Reliably managing the multi-pump control was the primary problem. In addition a bypass line was always open which degraded system performance.

PumpSmart Solution: PumpSmart's multi-pump operation has flawlessly managed the multi-pump control and has eliminated all pump failures. In addition, PumpSmart's flow data is fed into a PLC that now only bypasses flow during low flow single pump operation.

Customer Testimonial: The units have been operating without incident for close to 2 years without any need for adjustment. Our customer is very pleased with the operation and is looking for additional opportunities to apply PumpSmart.