NATIONAL TAB
INTELLIGENCE

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Project Summary

Phase 4

Phase 4 at Altium consisted of hydronic balancing for the Husky process water loop and the Husky tower loop. The process water loop includes two pumps, heat exchanger, and terminal flow devices. The tower loop consists of three pumps, heat exchanger, chiller, and two cooling towers.

TAB was first completed for the tower water loop. The pumps were set to design flow using the locking valves at the discharge of the pumps and calculating flow using the pumps' rated head for design GPM. The heat exchanger and chiller condenser were balanced using the locking valves. It should be noted that the design for the heat exchanger is 1000 GPM and Chiller condenser 750 GPM for total flow of 1750 CFM. However, each pump/cooling tower is rated for 1250 GPM. If only one pump is running, this would not satisfy the requirements for the heat exchanger and chiller so both pumps must run simultaneously to handle the connected load resulting in 2500GPM total flow design. There is no bypass present so full flow must pass through the heat exchanger and the chiller condenser. The chiller condenser was balanced to 904 GPM and the HX to 1582 GPM. The chiller condenser flow could not be balanced to within 10% of design due to limits with the notched butterfly valve so flow was left high instead of low. Closing the valve to the next locking position caused low flow. Flow distribution to the cooling towers was left as-is per the preliminary TAB survey performed prior to piping changes.

TAB was then completed for the process line water loop. The pumps were balanced via the locking valves at the discharge of the pump and setting to the pumps rated head. Once pumps were set to design flow the bypass valve was closed until the pressure in the supply header was at 45 PSI. With all bypass valves for the process machines closed, the pressure drop across each machine was found to be approximately 30 PSI as required. The bypass valves for each machine were set by first closing off flow to the machines then adjusting the bypass balancing valves until design flow was achieved. Note that flow could not be measured to the air compressors or air dryer also served by process water due to the lack of balance valves or pressure ports. No design criteria are provided for air compressors or air dryers.

Temperatures across applicable devices were not recorded since the system was not running with accurate heat loading from the husky line machines.

Phase 5

Summary Phase 5 at Altium consisted of hydronic balancing for the Husky chilled water loop. The chilled water loop includes three pumps, a chiller, and terminal flow devices. Note that Chilled pump number 2 does not run and was locked out during TAB. TAB was completed for the Chilled Husky system by testing each pump one at a time. Pump total flow was tested and confirmed to be in design flow. Next, the flow setpoint through the header bypass valve was calculated by subtracting the connected GPM load of the loop from the pump design GPM and the valve was adjusted to obtain that target GPM. Flow was then balanced to the two AHUs with the control valves fully open and flow was reduced to design using the balancing valves. Husky

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machines were then balanced by using gate valves to obtain the design pressure drop through the machines with bypass valves closed. Bypass valves were balanced by shutting flow off to the machines and adjusting the handle positions to obtain design bypass flow. Once all valves and machines were balanced, the final pump and motor performance was collected with the final chiller pressure drop.

Phase 6

TAB was completed for the Wheel system which consists of two chilled water pumps, two process water pumps, 1 Water cooled chiller, and flow to terminal devices (packaging machines)

For the process water loop TAB was completed by setting the pump total flows via the triple duty valves since the process pumps do not run off a VFD. Once total flows were set Bypass valves on the headers were set based on connected flow calculation. Bypass flow= Pump rated flow-Machine design flow total. Once the header bypass valves were set, Machine bypass valves were set to match the machine design flow. After all bypass valves were set, final pump performance was documented and listed in the following report. It is recommended that for the most optimal system performance that when a process machine flow is opened that the corresponding bypass valve gets closed to push the flow through the machine.

TAB was completed for the Chilled water loop by setting the pump to run at 60Hz constantly. Once at a constant speed all machine bypass valves were set to a minimum flow setpoint to prevent stagnant water in the lines. The pump control pressure setpoint was set by Replicating a worst-case scenario which is having flow to four machines with the pump at 60hz and recording the Differential pressure of 64.4 and making this the control setpoint. Final pump performance was then recorded and included in the report below. The control system was tested by closing off the machines one at a time and verifying the pump slows down