
7.0 Electrical Redesign – Breadth Topic 1

The adjustments to the mechanical system that are analyzed in the mechanical redesign have impacts on the electrical requirements of Straumann USA. The two major mechanical changes that impact the electrical system are changing the airside system from VAV to DOAS and changing the chiller from an electric centrifugal to a direct-fired absorption chiller.

Since the project is a renovation and not a new project, the change of chiller does not have nearly the effect it would on a new project. An absorption chiller certainly reduces the electric bill of the facility as well as the demand. However, since Straumann USA already has electrical wiring to the site as well as a main distribution panel changing from an electric to a direct-fired chiller would only produce savings in wiring cost from the main distribution panel to the chiller itself. However, the cooling requirements of the building are not being increased so new wiring to the chillers would not even need to be run. For Straumann USA there really would be no resizing of wiring necessary. If a direct-fired steam absorption chiller is used, the previous wiring can simply be removed. Reduced peak electrical requirements would be reduced with the absorption cooling and could result in a lower demand charge. The obtained utility rates did not include a demand charge, only a monthly cost per kilowatt hour. The demand charge could be averaged into the monthly rate but with the obtained information, there is no way of knowing if or how a lower demand would affect the monthly rate for the facility.

The major electrical redesign work is associated with changing the air systems from variable air volume to a dedicated outdoor air system. The DOAS significantly reduces the air handling units which results in a lower power requirement. This allows the wiring, breaker, conduit, and possibly the panel board to be reduced in size. The DOAS system is also a constant volume system so the need for electrical wiring to variable air volume and fan powered boxes for each space is eliminated. The resizing and removal of some of the electrical requirements could result in some significant first cost savings for the DOAS system. The changes effect the wiring to and from four panel boards and two motor control centers. While in a new construction setting the motor control center sizing could also be reduced, however, in this project it is not a new piece of equipment. It is only being reused in this project so no resizing of the motor control center is necessary.

Table 7.1-1 summarizes the feeders that require an analysis and any changes that are made. Table 7.1-2 give a brief overview of the branch circuits that change or are new and needed to be resized. Each panel board effected by the change in mechanical equipment can be found in full detail in the appendices. Refer to Appendix C for the VAV panels and Appendix D for the DOAS panels.

Feeder Summary of Alterations							
Panel Id	VAV			DOAS/VAV			Reason for Analysis
	Wire Size	Breaker Size	Conduit Size	Wire Size	Breaker Size	Conduit Size	
5HL1	2 sets of 500 MCM	800A	3-1/2"	2 sets of 500 MCM	800A	3-1/2"	Serves Panels 5HL2, 5HL3, 5HL4 (Reduction not enough to change the wire size)
5HL2	500 MCM	400A	4"	300 MCM	300	3-1/2"	Removal of VAV and FPB's
5HL3	500 MCM	400A	4"	3/0	200	3"	Removal of VAV and FPB's
5HL4	4/0	225	2-1/3"	#3	100	1-1/2"	Removal of VAV and FPB's
2MCC-1	2 sets of 500 MCM	800A	3-1/2"	2 sets of 250 MCM	500	3-1/2"	Size change of air handling units
10MCC-1	#1	100A	3"	#10	25	3/4"	Removal of freeze protection pumps for VAV AHU's

Table 7.1-1 Feeder Sizing Alterations

Branch Circuit Summary of Alterations					
Panel Id	Item Description	Action taken	Wire Szie	Breaker Size	Conduit Size
5HL2	VAV Boxes	5 Single Phase Ciructs Removed	#14	15	1/2"
5HL2	FPB'S	4 Single Phase Circuits Removed	#14	15	1/2"
5HL2	FPB'S	4 Three Phase Circuits Removed	#8	30-40	1-1/4"
5HL3	VAV Boxes	4 Single Phase Ciructs Removed	#14	15	1/2"
5HL3	FPB'S	3 Single Phase Circuits Removed	#14	15	1/2"
5HL3	FPB'S	2 Three Phase Circuits Removed	#8	30	1-1/4"
5HL4	VAV Boxes	6 Single Phase Ciructs Removed	#14	15	1/2"
5HL4	FPB'S	1 Single Phase Circuit Removed	#14	15	1/2"
5HL4	FPB'S	2 Three Phase Circuits Removed	#8	30	1-1/4"
2MCC-1	VAV Units	6 Three Phase Circuits Removed	#10 - 1/0	20-150	3/4" - 2"
2MCC-1	DOAS Units	4 Three Phase Circuits Added	#12	20	3/4"
10MCC-1	Freeze Protection Pump	6 Three Phase Circuits Removed	#12	-	3/4"

Table 7.1-2 Branch Circuit Alterations