Heating, Cooling and Lighting Load

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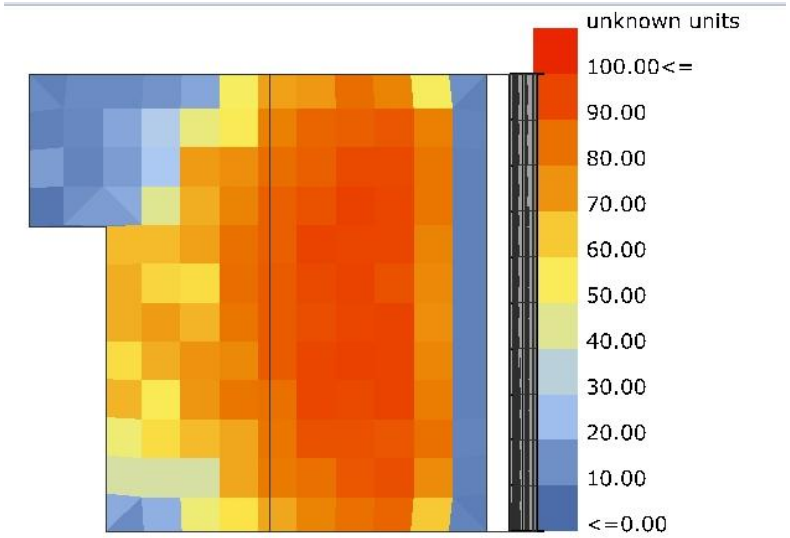
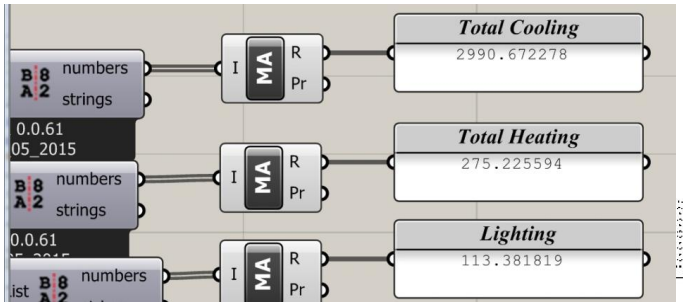
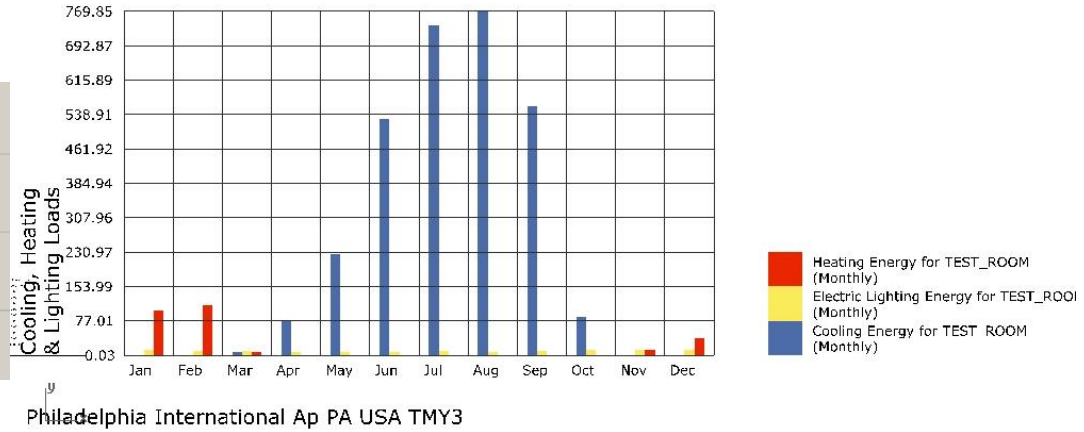
Annual Daylighting

Annual daylighting is being provided based on the grid. It states that 65.44 percent of the room is getting 50 percent daylight or more.
SDA:65.44



Although annual daylighting is being enough provided into the space, the energy use is quite high in this case.
The Huge load of cooling is shows that a lot of light is entering the space.





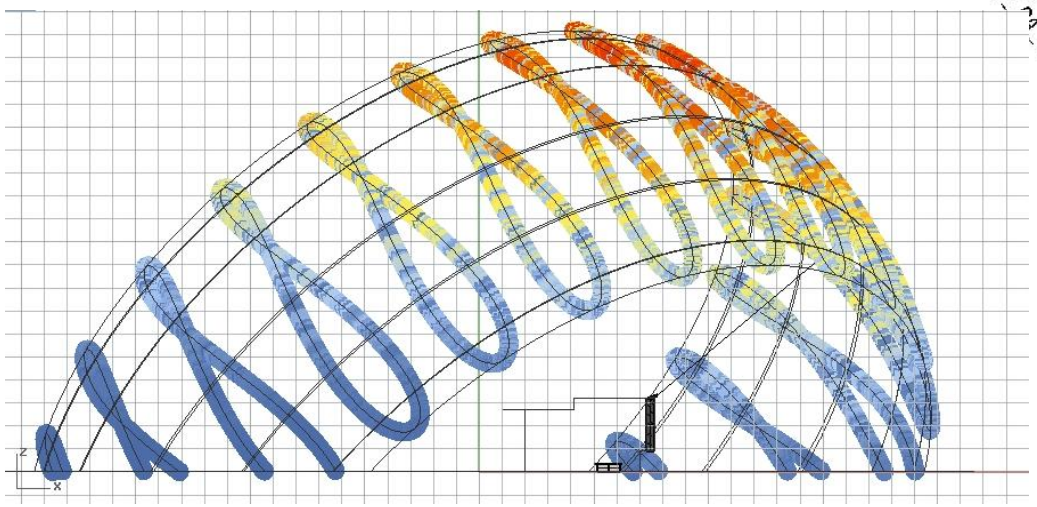
Problem diagnosis

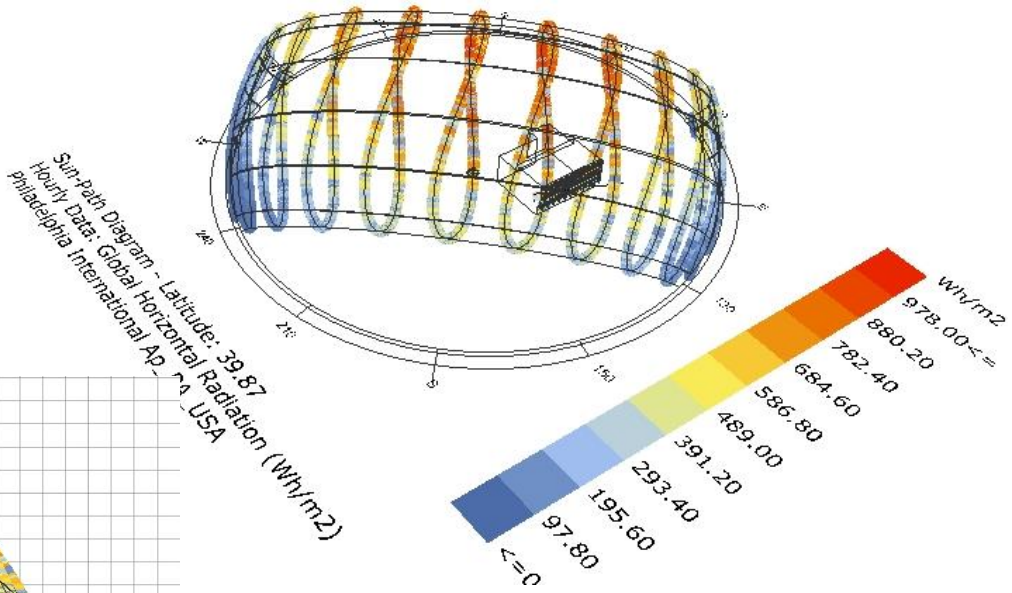
The huge load of cooling is showing that too much light is entering the space.

Annual daylighting is showing that enough daylighting is provided into the space.

As a result, it can be understood that the sunlight is need into the space but the solar radiation which is causing heat should be blocked.

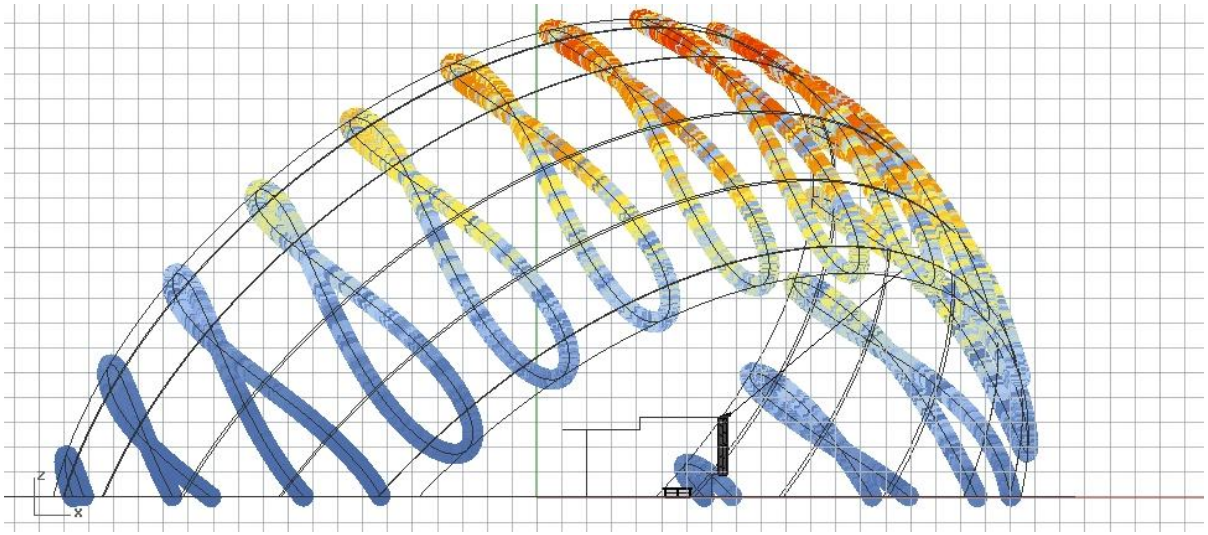
To reach a better understanding of the problem sunpath has been studied.



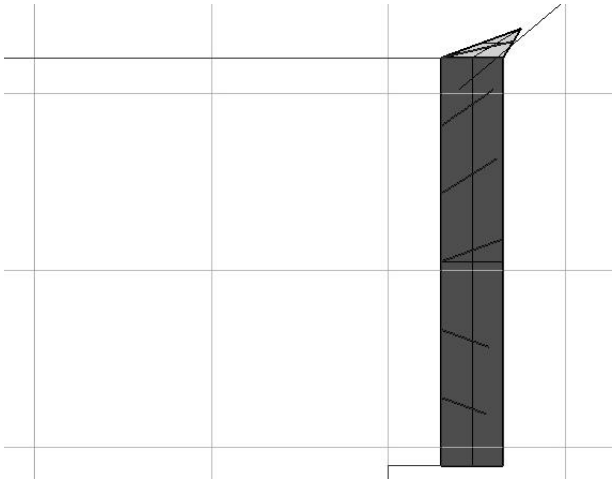


Problem Solving Process

Sunpath shows that approximately the problematic points of the sunpath are on June, July, August between 9 a.m.-14p.m.



For June, July and August, the VSA has been calculated to design the shade to block the irritating solar angles which are causing heat into the space.



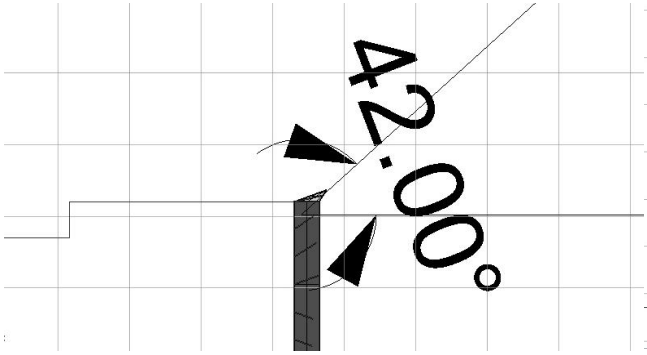
9A.M
21 June: VSA = 38.3

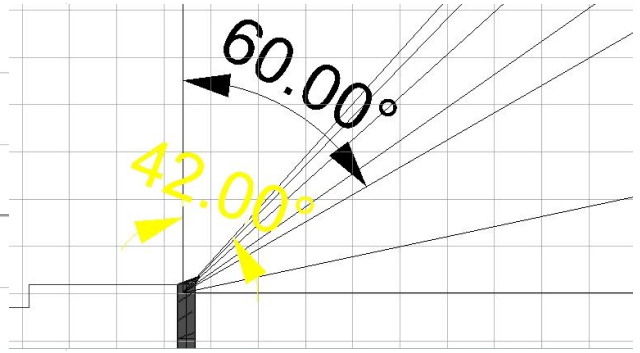
10A.M.
21 Jun:58/July:55/Aug:52

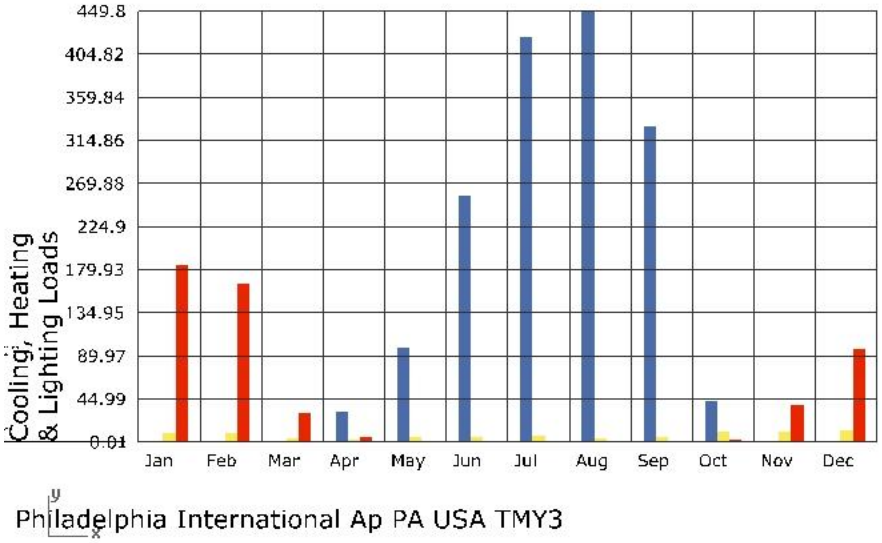
14P.M.
21 Jun:60/July:58/Aug:52

Problem solving Process

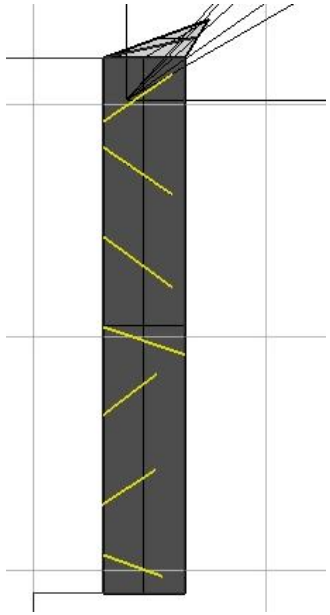
As illustrated in the section the sun rays which are causing the heating are not being blocked. Consequently, the shades should rotate to the way to block these sharp rays in summer and winter.(design based on worse scenario)

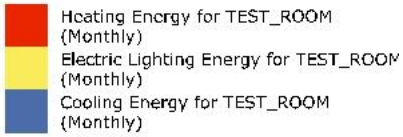




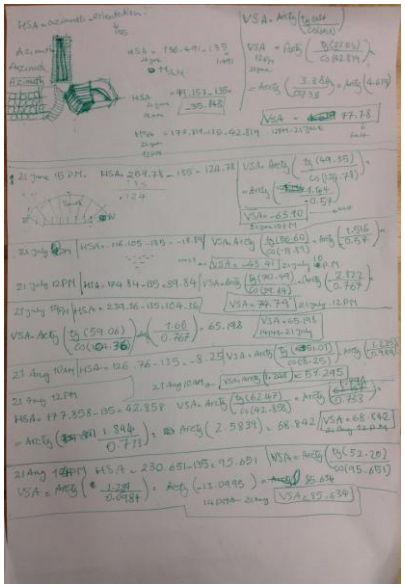


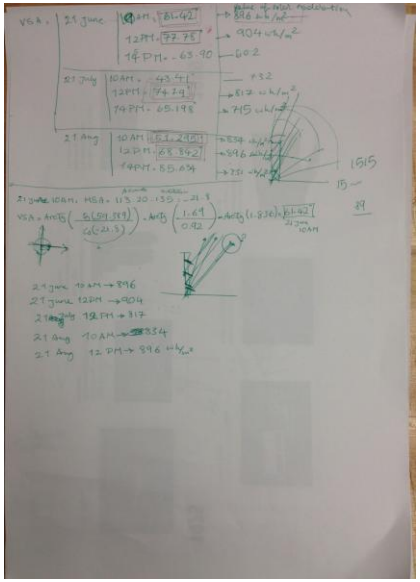
Unless horizontal panel are rotated to block the sharp vectors in winter and summer , there is still a lot of cooling load showing on chart on June, July and Aug.

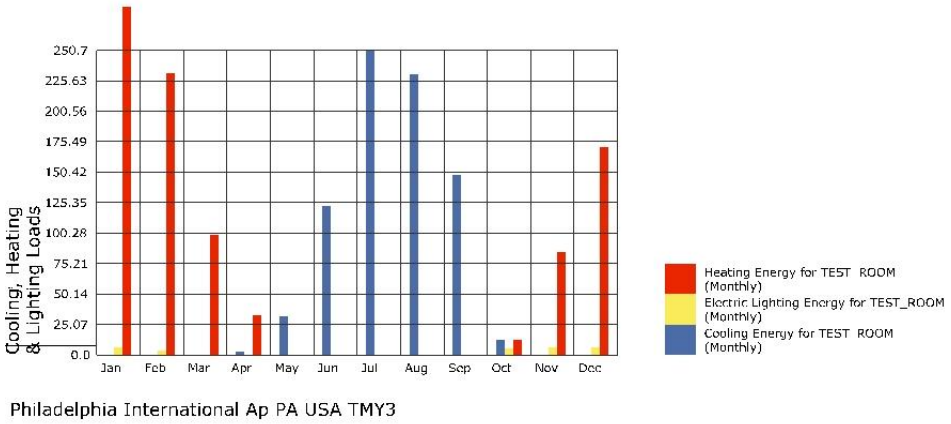




Best Result Achieved







Summer sharp vectors are calculated and values also figured out and those high values in summer are blocked and then it was observed that heating load was raising up which was showing that more radiation needs to get in.

To solve this problem, VSA in Jan, Feb, Dec which are then months with most heating load was calculated and lower parts of the shade designed in a way to let these vectors come in.