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WILKINS BUILDING SHOP
OVERVIEW OF PROPOSED MECHANICAL SCHEME

1. Background to the Project

A design for the new layout of the shop to heat/cool and ventilation was required with a quick turnaround to allow the project to move forward in June 2021.

2. Existing Systems

The existing shop and stores were heated and cooled via multi split DX fan coil units with the condenser located within the adjacent external well.

There is currently no LPHW heating within the shop area. Adjacent areas have LPHW however to connect into these systems would be problematic as would require a complete rebalance of circuits/floors and potential put those systems at risk of not providing sufficient heat to the spaces they serve.

The existing supply air ventilation was located in a cupboard as a vertical fan unit and ancillaries with an air intake from the well.

The extract fan unit discharged into an enclosed space formed (believed) when ramps were installed to the Wilkins Building entrance.

3. Proposed Layout

The new layout includes a number of integral chiller cabinets for food and drink. These cabinets discharge their waste heat directly into the space. They would operate 24 hours a day. The total heat gain from these units is in the region of 6kW.

The area has some single glazed roof lights that provide some natural light. The roof lights also (although subject to building shade) do provide some heat gain to the space. These do not appear to be openable.

The majority of the space is below ground and therefore lighting is required to be operational all the time to maintain lighting levels.

The total heat gain peaks at around 12kW

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4. Proposed Systems

The existing method of heating/cooling the space with DX multi split units was retained (although with new replacement units as the existing are beyond their design life).

A new ventilation system was installed to provide fresh air for occupants only with extract redirected to connect to an existing louvre leading to the adjacent well.

5. Alternative Systems

To eliminate the need for mechanical cooling alternative methods of removing the heat gains to the space were considered.

To naturally ventilate the space the existing roof lights would need to be changed to some form of either manual or automatic opening vents. This will require listed building/planning consent as it is changing the appearance of the building. To provide make up air to achieve some form of cross flow air path to assist with the removal of heat their would need to be some form of louvres on another elevation. The only other external wall is the small area that leads to the adjacent well. There is not sufficient wall space to provide this and would also require listed building consent. Please refer to photos.

Mechanical ventilation was also considered however the same issue with available louvre space to discharge and introduce make up air to the space does not allow this scheme to be viable.

Calculations for the space indicate in summer months 7 air changes (approximately 800 l/s of air) is required to maintain 39°C. To maintain 30°C it exceeds 100 air changes. During winter months this reduces to 6 air changes to bring the room temperature to normal conditions however that is because we are introducing cold winter air and will therefore produce cold spots and draughts.

6. Photos of the Shop

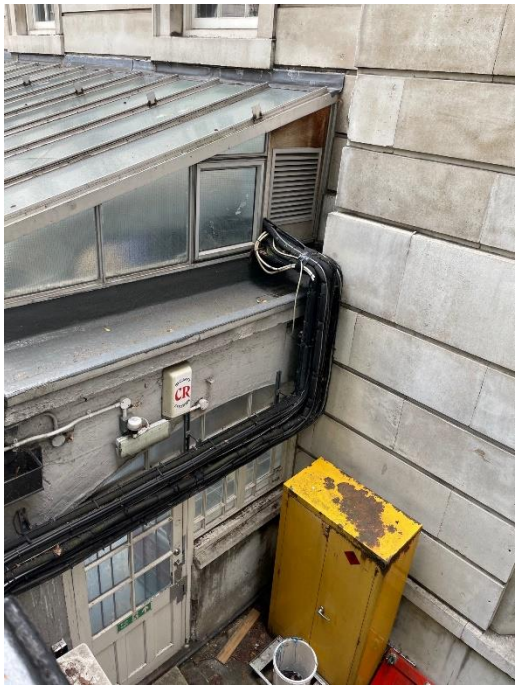
Roof Lights

Roof Lights

Roof Lights

Entrance to well from shop

Existing DX fan coil unit



Entrance to well from shop

7. Calculations

Building : South Wing Shop
Engineer : David Bool *Date* 05/07/2022
Checked by : *Date checked :*

Design basis

Location London

Design day 21 July

Air room design temperatures used, no room heat losses are added to project totals

Outside 28.2 °C dry bulb/ 18.3 °C wet bulb

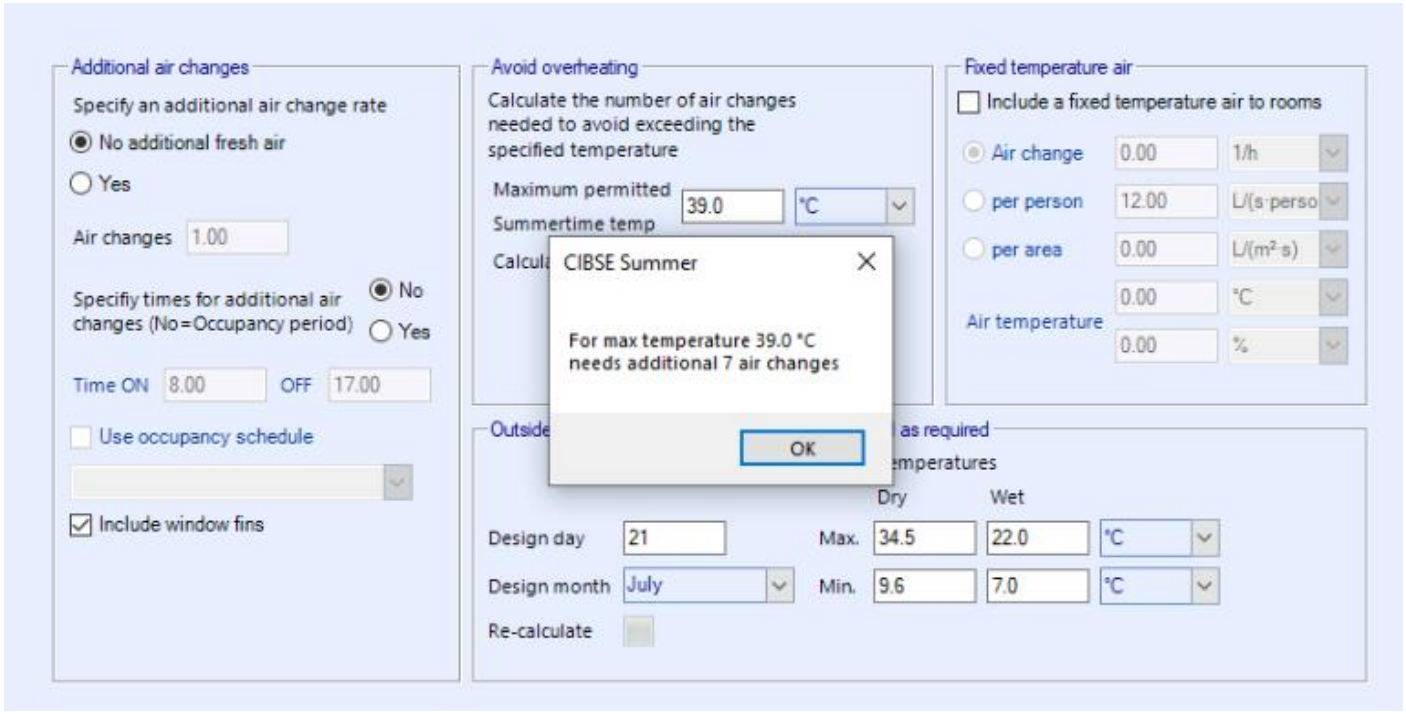
Room temperatures not allowed to rise (Temperature rise : 0 °C)

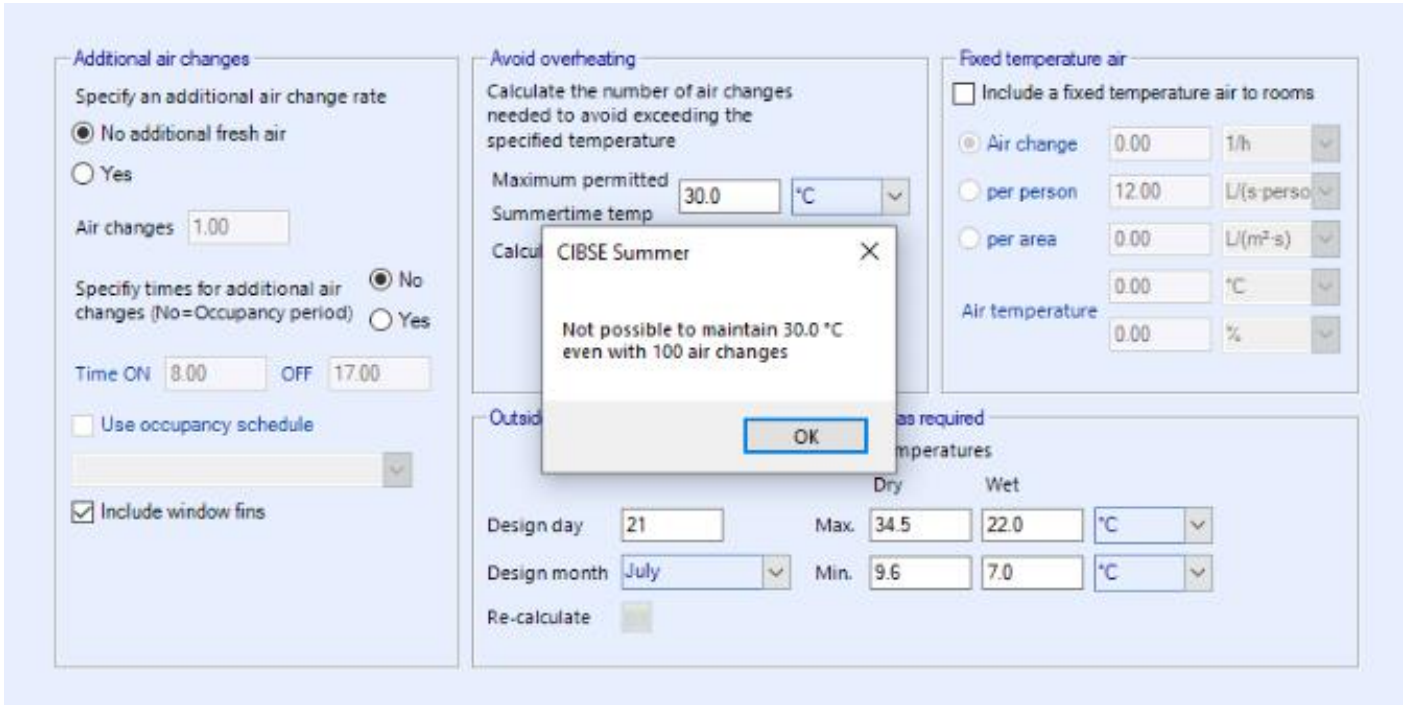
Rooms Included : 2 rooms included

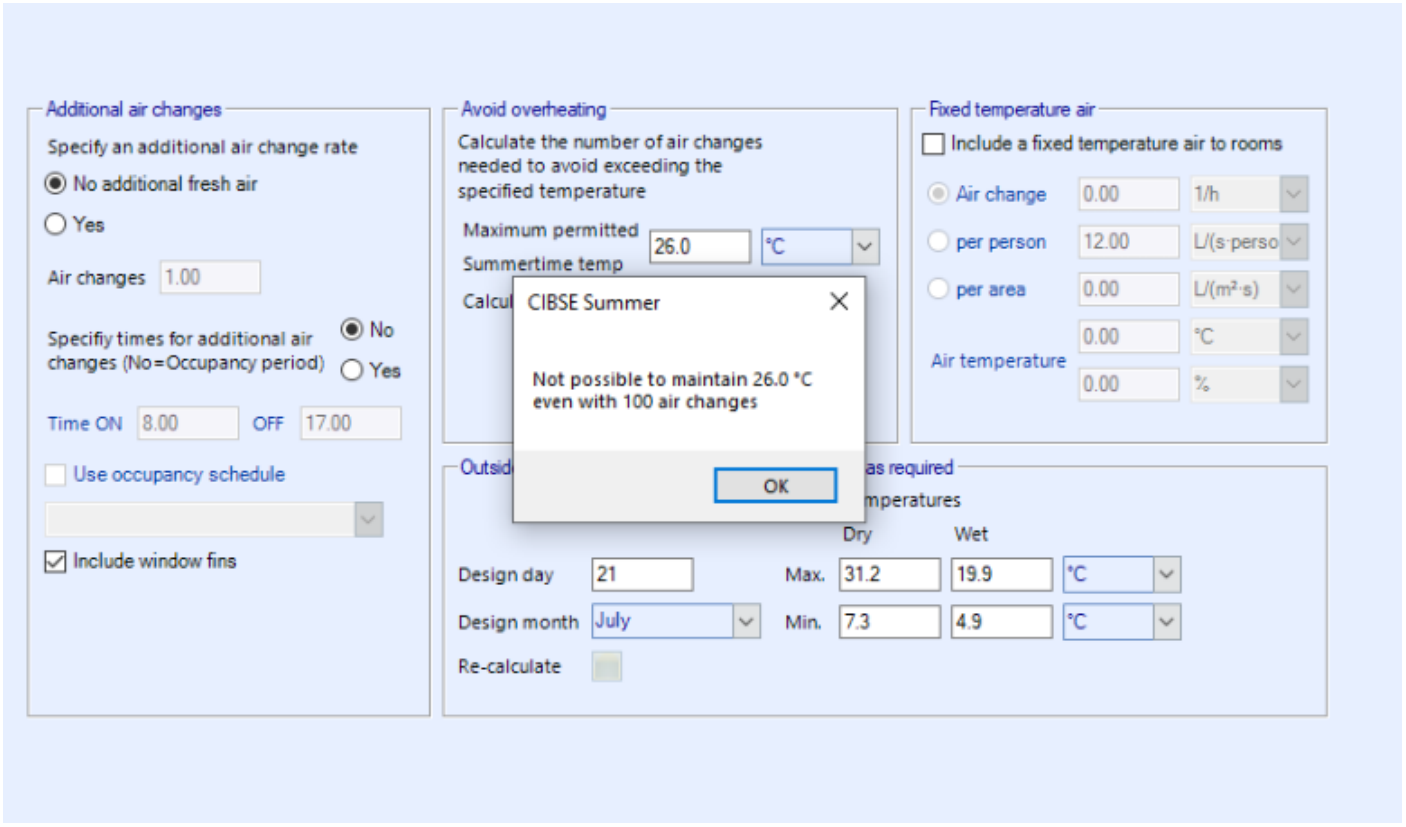
Summary results

Room ref.	Peak room loads (W)			Time of peak	Maximum temp.
	Sensible	Latent	Total		
Shop Floor	12110	960	13070	16	26
Shop Store	296	127	423	17	26

Summertime Air Changes






Additional air changes
Specify an additional air change rate
No additional fresh air
Yes
Air changes 1.00
Specifiy times for additional air changes (No=Occupancy period)
No
Yes
Time ON 8.00 OFF 17.00
Use occupancy schedule
Include window fins
Avoid overheating
Calculate the number of air changes needed to avoid exceeding the specified temperature
Maximum permitted Summertime temp 26.0 °C
Calcul
CIBSE Summer
Not possible to maintain 26.0 °C even with 100 air changes
OK
Fixed temperature air
Include a fixed temperature air to rooms
Air change 0.00 1/h
per person 12.00 L/(s·perso
per area 0.00 L/(m²·s)
Air temperature 0.00 °C
0.00 %
Outsid as required
mperatures
Dry Wet
Design day 21 Max. 31.2 19.9 °C
Design month July Min. 7.3 4.9 °C
Re-calculate