

Improving Air Efficiency Through AHU Reconfiguration



Introduction

As older buildings mature, there is an opportunity for them to develop into a new refurbished alternative. That could be either complete re-development or the need to refurbish due to changing of space requirements. With this, brings the question of the buildings infrastructure and whether or not the proposed changes to the space needs can be adopted.

Naturally all refurbishment projects that involve substantial building works must be carried in accordance with the recent changes to the building regulations, the need for compliance and British Standards along with other codes of practice. This poses questions about the state of buildings M&E services. - Can the existing heating/Cooling system cope with a potential increase in capacity? Is additional fresh air required in the occupied space? Is the ventilation adequate and therefore in compliance with minimum Air Change requirements?

Taking that all into account the attention is then therefore focused on what type the systems are, and whether they are fit for purpose? If not, is there additional capacity available out of the existing systems to deliver the required duties, or is a new system needed?

Air handling units (AHUs) are used to supply and circulate conditioned air around a building and/or to extract stale air as part of a building's heating, ventilating and air conditioning (HVAC) system. In many cases there is the potential for these AHUs to be reconfigured to accept new components to increase capacities, or to improve energy consumption with newer components.

What is an Air Handling Unit (AHU)?



Essentially, an AHU system comprises a large insulated metal box that contains a fan, heating and/or cooling coils, air filters, sound attenuators and volume control dampers. In most cases, the AHU is connected to air distribution ducting. Alternatively, some AHU's can be open to the space it serves.

The Supply air passes through the AHU, is filtered and is either heated or cooled, depending on specified duty and the prevailing weather conditions. In some buildings, Air Handling Units are used only to supply fresh air for ventilation and extract stale air.

For heating or cooling, AHUs may be connected to additional equipment such as boilers (for heating the air) or chillers (to cool the air). Alternatively, heating or cooling may be provided by electric heating elements or separate refrigeration units either built into the unit or remotely situated.

When AHU systems are used to extract stale air from the building, a controlled proportion of this air may be recirculated to avoid having to heat or cool all the supply air. AHUs can also incorporate heat recovery mechanisms to extract heat from the air being expelled and use it to heat incoming supply air.

New Equipment vs. Refurbishment

Having calculated the correct amount of air the AHU(s) need to deliver, the question then becomes obvious. Do you need a new AHU or can we re-use the existing units, and if needed re-configure the AHU to suit the new requirements. Clearly there will be many advantages of having a new AHU as it can be bespoke and tailored to specific requirements based upon the new occupier needs.

On new build projects, the AHU size and weight can be taken into account at design stage so they can be adequately incorporated into the building. Obviously with a new product comes warranty and the trust that it will do 'what it says on the tin' and many clients prefer this approach. In many cases new AHUs can be incorporated onto existing buildings but the buildings structure must be checked and then the question, how the unit will be physically positioned?

Alternatively, there may be an opportunity to refurbish the existing AHU and bring it up to current specification. One of the main reasons for this is access; some units are positioned within equipment plantrooms, and therefore will be surrounded by other mechanical/electrical services therefore making it difficult to install a new unit. Another reason is cost; as the delivery and positioning cost can mount up, which will be on top of the new equipment cost. Generally speaking, a refurbishment project can be a quicker turnaround to completion making it more appealing to clients.

Often many units are re-configured to accept new energy efficient components, i.e. stripping out older style fans with the latest Energy efficient Fan technology, removing in-efficient electric heaters, and installing hot water coils or gas burners.

Example 01:

Removal of old cooling system and installation of new remote heat pump.



Example 02:

Replaced old style fan and installed direct drive AC 'plug fan'



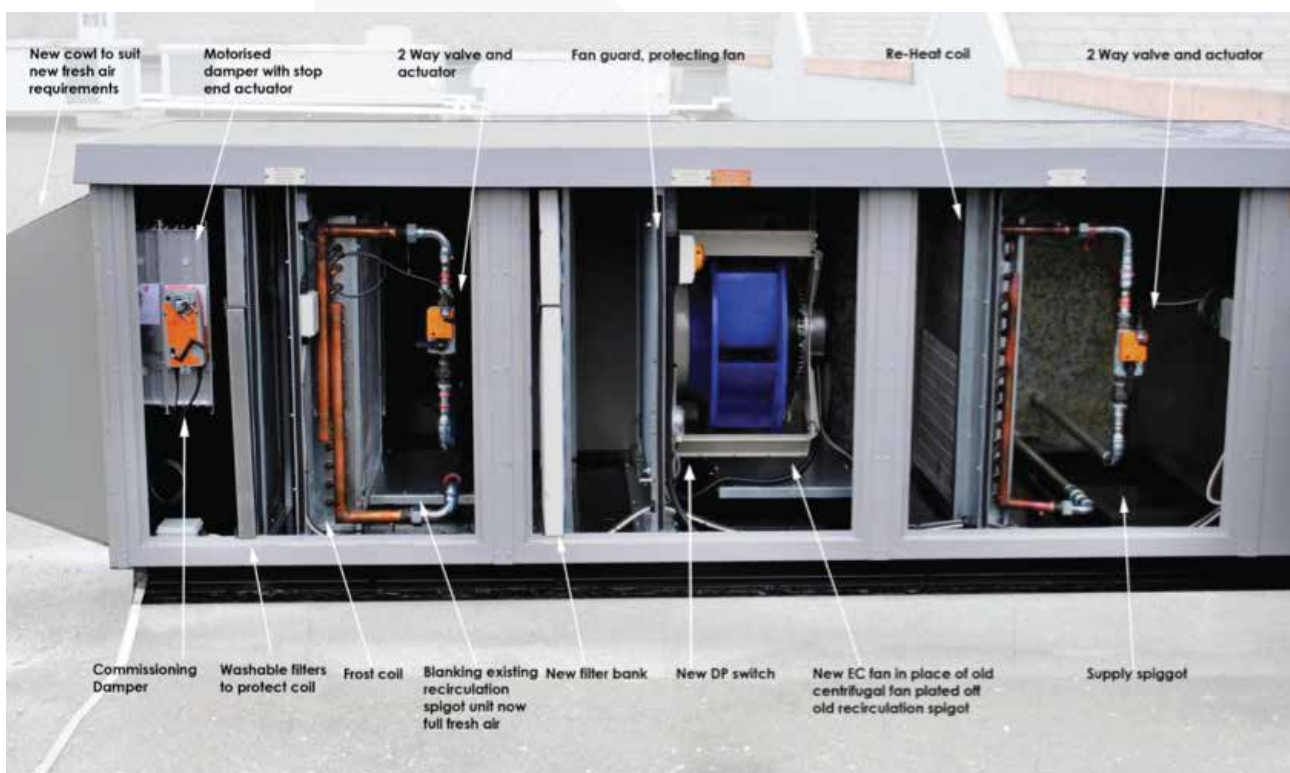
Older systems using outdated Cooling mediums have been replaced by appropriate an alternative efficient heat pump.

The AHU could also be reconfigured to supply an increased amount of supply air by installing new larger fans, however this will be limited by the physical size of the AHU. The filters would also need considering to see if they can accept the additional air volume, although different filter configurations can be looked at to increase surface area, or high velocity filters could also be considered.

Before Refurbishment



After Refurbishment



Conclusion

There is always a method for delivering the revised conditioned air to the building that its occupants need, whether a new AHU or to reconfigure and reuse the existing one. A new AHU will provide exactly what's required, however retrofitting to a current building could be tricky. You could be limited on the performance of the current AHU, but an additional in many cases 15-20% above the original design is possible, in many cases substantially more.

By reusing the existing AHU it's generally substantially more economical and there will be a warranty provided on the new components installed. Along with a good regular planned maintenance schedule, a refurbished AHU can provide an additional 5-10 years on its life cycle.

Reusing existing AHU units
can be more economical



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