VIRUSES IN BUILDING SERVICES; WHAT SHOULD WE DO?

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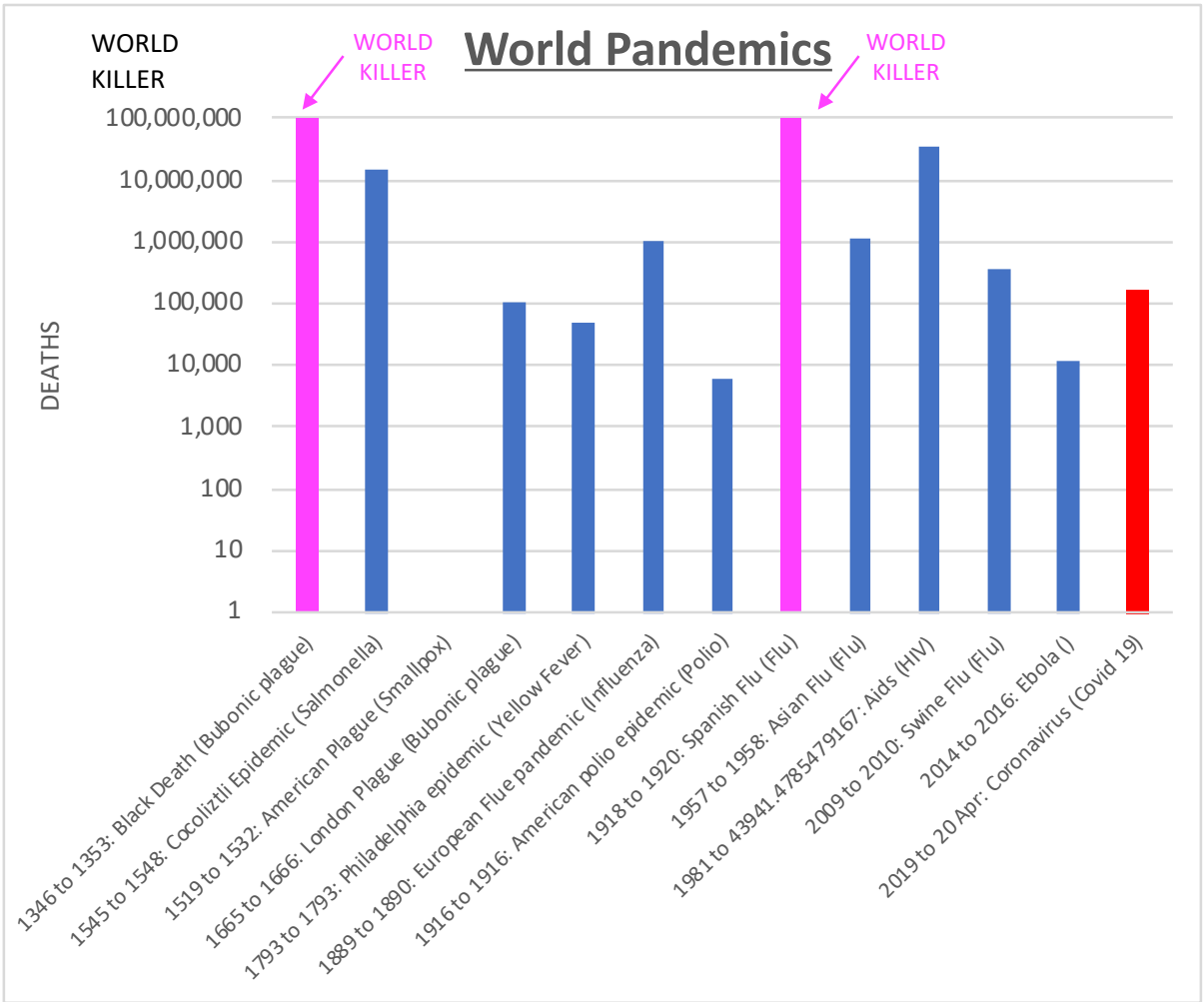
Nobody could imagine the effect coronavirus has had on the world we live in, both in terms of death and economic misfortune. As Building Services Engineers we may have contributed towards global Carbon Emissions although sleep at night with the comfort that the current pandemic was not spread through building services systems.



Many medical and viral experts believe the biggest threat to mankind will come from a viral pandemic and these are becoming more and more sophisticated as our world changes often due to human influences. Sick building syndrome has been around for decades but can we honestly say that a pandemic infection cannot be spread through the extensive and complicated ventilation systems we install within buildings today? Do we really know how future viruses will evolve?

When someone sneezes we hope that the larger droplets >10 µm fall within a 1 to 2 meter range, but smaller particles less than 5 µm become airborne so surely we should be thinking of eliminating all recirculating systems, but these include:

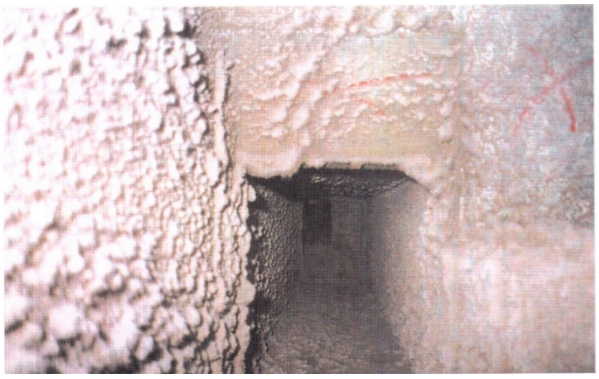
- Thermal wheel heat recovery – the most efficient heat recovery device we have
- Recirculation within air handling units – which reduces ventilation loads considerably and their consequential carbon emissions
- Fan coil units both DX and water based – we install millions of these
- Ultraclean Ventilation Hoods (UCV) within operating theatres – they do have HEPA filters but nonetheless do recirculate

- Any fresh air distribution system which is not entirely clean – you might pick up food you accidentally drop on the floor but would you honestly eat something which had been the exposed to the internal surfaces of a ductwork distribution system?

Would you be surprised to see any of the following within a building?

Insects within an AHU

Dirty mesh intake



These ducts convey air that we breathe

So many of the systems we currently design would be eliminated leaving the following options:

- Natural Chilled beam systems (must be exposed and cleanable)
- Full fresh air ventilation to internal spaces but these need to be “part of the room” (a fresh air highway) rather than through a concealed un-cleanable distribution system
- Chilled floors, walls and ceilings – can’t offset huge sensible loads
- Or something the weekend cleaner can access and clean

Luckily lighting and equipment loads have dropped significantly during the past 10 years bringing room sensible cooling loads to levels which do not require massive mechanical cooling systems. There are so many buildings which are vastly oversized with much of the plant and systems either unnecessary and overcomplicated.

Building users also need to become more realistic about the environment in which they live. We all welcome warm sunny periods at home wearing flip-flops, shorts and loose fitting T-shirts, but we "expect" the work environment to be 22 ^{o}C ± 1 ^{o}C. Consultants consequentially over design with capacity factors, plant and systems specified to ensure that they don't get sued which is understandable in the current construction climate, pushing up construction costs by 10 - 20%. Why can't clients accept a 10% contingency at the Consultant's discretion rather than spending thousands on cost control functions?

So what's wrong with naturally ventilated buildings? Why can't we incorporate fresh air highways within the internal space constructed as builders work shafts complete with the bottom section opening automatically under the BMS to allow the cleaner to vacuum on a weekly basis? Why can't air filters be located within the occupied zone with replacements as easy as changing a vacuum cleaner filter? What's wrong with the temperatures we experience within our homes? Why is everything so complicated that it needs to be managed by a specialist Facilities Maintenance company?

If we really need to introduce a recirculating device such as a fan coil unit why not locate it within the occupied space complete with hinged facia panels, which easily expose the entire unit internals so that cleaning can be undertaken by the weekend cleaner or the Office Manager? (we all know that ceiling mounted plant is never fully accessible and basically does not get cleaned because you can't get to it)

In summary we need to bring the Building Services systems into the occupied zone and:

- Eliminate recirculation
- Rethink the need for excessive cooling loads
- Give the designer greater flexibility and cost control as they do in Europe
- Locate all building services systems within the occupied zone so that maintenance can be easily achieved
- Re-design all ventilation plant and equipment to include full front-access for cleaning and maintenance purposes
- Develop the use of fully accessible fresh air highways
- Ensure that all air filters are easily accessible and can be changed by anyone

This will significantly change building services systems we design with simpler systems which are fully accessible and clean. They still need to be carefully designed without short cuts and cost control restrictions.

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