

LIVABLE BUILDINGS: DESIGNING FOR COMFORT & PRODUCTIVITY Q & A

How do you foresee sensing technology and personalization of living spaces evolving in the future (e.g. Sensing on every person or in every room of a building)

The speed at which technology is advancing can be mind boggling at times. The amount of data that is being generated today through sensors and otherwise has been growing at a staggering rate and is mainly driven by the affordability of sensing technologies. Just look at cars and other devices today versus a few short years ago. It is apparent that personalization will only become more important in the future. I'd expect that capabilities and business models will emerge in the near future within the building space that will allow personalization of living or workspace to enhance comfort and productivity of individuals.

I know most high-rise buildings have full BAS/BMS setups... Can you talk about connectivity in low-rise light commercial buildings? What activity is going on here with regards to the Internet of Things?

The recent U.S. building census data indicates that only ~15% of light commercial buildings have connectivity. The challenge is coming up with a solution that is easy to apply / integrate into smaller commercial buildings with a ROI that is compelling for facility managers and operators to justify the investments. The biggest promise for connected buildings that we see is around operational efficiency regarding pro-active maintenance and remote scheduling of building systems. A third benefit is the resultant energy savings that can be achieved because of the building optimization.

Comfort is different for everyone. How do you make the majority happy in their living spaces by leveraging emerging technology?

This makes me think about a political debate held in state of New York recently and a big point of contention was the temperature setting. One of the candidates wanted a high temperature and one wanted a low temperature and they really fought about that. So yeah, comfort is different for everyone, absolutely. Fortunately, in most businesses, the dress code doesn't require the three- piece suit that it used to, so that gives people a lot of flexibility to dress in ways that will help themselves regulate comfort, which is good because people have different metabolic rates. Some people have jobs where they're moving around a lot and some people are sitting at their desk. That doesn't answer leveraging technology.



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The one thing that does come to mind about leveraging technology, and they actually have this here at the Helix, they have a working HVAC system, which is very cool. The one that they have is a zoned system, which allows rooms to be different temperatures. You can actually heat one room and cool the next room. So, you can really dial in the temperature that you need for the use that is going on in the room. Another technology is called an underfloor air distribution system. It's not right for everyone, but with an underfloor air distribution system, at every single desk or cube, a person can control the air flow. They can't control the temperature, but they can control the air flow coming up to their desk. So, there are a couple of solutions. When we talked about personal factors, that's definitely one that you can use to control comfort, your clothing, like you mentioned. Maybe some advancements in clothing are coming our way too, we'll see.

I'm aware of the emerging efficiency minimums for new equipment, but can you comment about emerging solutions for the existing installed base?

The Department of Energy has an advanced rooftop unit campaign where they promote retrofits of rooftop units and this involves the installation of controls, sensors, and perhaps even a building automation system that really maximizes the efficiency of the unit or units. Often times, we find that rooftop units that have been installed and operating for a while just aren't operating at their designed spec, let alone, at the most efficient spec for today's technology. Many utilities have incentives around that program as well. The DOE has some great resources and you could also check with your local utility.

What proven strategies have been deployed to ensure a new or re-modeled building "maintains the gains" it receives from a comfort, energy efficiency perspective? In other words, how does a facilities or operations manager ensure that the comfort and performance of the building doesn't degrade over time?

That's really a huge challenge. Study after study, show that buildings do typically degrade in performance over time, due to a number of factors. A lot of it has to do with the controls of the systems. The first thing that I typically recommend is to invest in things that don't require control. Things like insulation and air sealing of the building. We talked a lot about comfort and HVAC/R, it's hard to control air temperature and humidity if you can't control where the air is going inside the space, if its leaking out of the building.



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So, get the air sealing and the insulation of the building under control, get that tight, get that air sealed and you're going to save yourself a lot of heartache in the long run. After that, invest in a control system that is within your capacity to operate and maintain. If you have a wiz- bang facility staff, an engineer onsite who can handle a fancy fully automation system, that is awesome. You can do a lot with that, but if you invest in that wiz- bang system and you don't have someone who can handle that system and maintain it then you're probably going to lose a lot of your investment. Know what you can handle and invest in the system that makes sense for your needs and your capacity.

When you design for comfort, you have listed several considerations with temperature, humidity, air movement and others. Are there considerations within system design for VOC's and CO2 level monitoring/ control within the conditioned space?

VOC's (Volatile organic compound) and CO2 are definitely factors when designing buildings. The way I like to think about any indoor air quality issues is to start by trying to eliminate any contaminants in the first place. With new buildings, try to use low or no VOC products. Sometimes it's challenging to completely eliminate those products. The next step is to use ventilation solutions that will both evacuate the space and then to bring in outdoor air. We've talked about ventilation for lavatories and dedicated outdoor air, there are obviously several different solutions for outdoor air, but those are two that I really like a lot. CO2 monitoring is probably the most mature and accepted indoor air quality monitoring in all buildings, commercial buildings. It can be a very effective way to control ventilation in parts of buildings that are used intermittently. For instance, in an auditorium or gymnasium it is a great way to control ventilation, being able to turn it on and off, depending on the ventilation needs for that space.

With the new efficiency standards for 2018 and 2023, if I have an existing building with a RTU that needs replaced with no other modifications besides the roof curb, will exact replacement units be available or will all units for replacement be the higher efficiency?

If the exact replacement unit meets the existing Department of Energy (DOE) national minimum efficiency requirements then yes, you can replace it with a like for like unit. However, if it is an older system that has a lower efficiency level you will need to replace it with a higher efficiency unit that meets the DOE minimums. In most cases it is likely that equipment manufacturers have designed this higher efficiency equipment to fit the existing roof curb.

A woman with blonde hair, wearing a light blue button-down shirt and jeans, is sitting in a black leather chair. She is looking towards the camera with a slight smile. The background is a bright, modern interior with large windows. Overlaid on the image are various digital graphics, including a globe, a cityscape, and a network of white lines connecting circular nodes, suggesting a smart building or IoT theme.

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Is there a cost- effective building control system that can be added to existing systems, say for a big box retailer that has several locations?

Yes, there are several manufacturers of advanced control systems that are affordable, qualify for utility rebates, and will save the retailer operating costs. A company called Transformative Wave is one example that comes to mind with their Catalyst product for control and monitoring of light commercial rooftop equipment.

I've heard some discussion regarding next generation refrigerants. Should I be concerned with the future availability of R410A for servicing if I install a new roof top unit today?

This is a huge issue for our industry right now. We are going to transition to lower GWP refrigerants. The timing on that is a little uncertain, as federal regulations are shifting and taking more of a back seat right now, but we do have a few states right now that are jumping in, California being the leader at this point. I wouldn't be worried about R410A availability at this point. I think we're going to have several more years of R410A designs in new equipment, plus an allowance for servicing. It's important to remember that the Kigali Amendment is really a phase down, not a phase out like we faced with the R22, so we are going to have availability for servicing R410A systems for quite a while.

What does GWP stand for?

Global warming potential. We are moving to lower GWP refrigerants.