Embracing the era of smart, sustainable, and slick buildings

By Faiyad Peterson

29 Jun 2022

Globally, there is a significant drive to achieve a net-zero carbon footprint and make buildings more sustainable and energy efficient. But this extends beyond the environment and must incorporate the health and wellbeing of people as well. Going the sustainable route certainly bodes significant long-term benefits for landlords, owners, and tenants, including but not limited to savings on building costs, increased employee productivity, and fewer people having to take sick leave.

Faiyad Peterson, regional director: structures, WSP in Africa

From railway stations to office blocks, a worldwide tipping point is approaching between those countries actively embracing centralised, smart cities and those who are falling behind. But more than the technology impact that smart cities will have, they are instrumental in developing the communities surrounding them. After all, it takes a broad spectrum of services to make smart cities operate. This requires a mix of health and wellbeing, ease of mobility, access to restaurants and supermarkets, and other services.

Building designs are also becoming slicker. There is a focus on using less material and going modular. Think of this as akin to building with Lego. Once its served its purpose, a building can easily be dismantled and shaped into something else. For instance, if the Cape Town Stadium was designed on this basis, the area could now have been used for other functions such as residential, shopping, or even schools.

Adding impetus to this is the need for digital adoption to happen. While South Africa is still behind in certain aspects, things must change for the country to become future-ready. Achieving net-zero and embracing smart will be critical elements in this regard. Yes, budget will always be a challenge. But government and the private sector must look at the long-term potential as opposed to getting a short-term return on investment. Making things more efficient must become a priority. And being sustainable and smart become integral to enable this.

Construction industry needs to adopt sustainable alternatives - study

31 May 2022

Evolving engineering practice

In the past, engineers and architects had full responsibility and control over the projects they worked on. But as these projects have become more complex and the futuristic design concepts pushed the boundaries of what is possible, engineers and architects with different expertise started collaborating across different geographic locations. This has seen the adoption of digitally driven collaborative tools.

Today, engineers and architects can work in virtual environments, reviewing and signing off designs and construction remotely. Engineering companies that have been in the forefront of adopting these new practices have seen improved results while also reducing their overhead costs, improving worker safety, and even allowing for a better work-life balance.

Design with a difference

Artificial intelligence (AI) continues to grow and become more sophisticated in all industries. AI is used in engineering software for generative design, material selection, and robotic process automation. AI generally adopts machine learning. This plays to the strengths of machines which are better and faster than humans in coming up with hundreds of solutions to a problem, including informing the most efficient solution in a shorter space of time.

However, machines can only take instructions from us. Therefore, the solutions and accuracy provided by the software are only as good as the information we input.

Generative design has also become increasingly popular. This is an iterative design process in which an engineer or designer enters certain constraints to a problem (size, weight, strength, etc.), and requests the computer to provide options. AI is then applied to materials selection, code compliance, and even any other contributing factor related to the problem. Additionally, robotic process automation software enables bots to automate administrative tasks, such as raising invoices, verifying change orders, or managing bills of quantities.

For most applications, AI is already being built into the software, but engineering and architectural leaders will need to be sure they have people who can train and maintain the underlying models, so it is important to understand how specifically AI is being applied.

5 sustainable engineering projects to inspire your firm to go green

Silversoft 27 May 2022

Codefying the process

As any engineer or architect knows, design is an iterative process despite the benefits that AI can bring. As the technology evolves, so do the core skills required and the engineering language used. Traditionally, a graduate might have needed maths and physics as background to complete their degree. But in a modern world, this must be enhanced by skills in computer programming and digital workflows.

Take visual programming as an example. Platforms such as Grasshopper offer a visual programming interface that allows the programming logic to be readily seen, understood, and implemented. Flowing from here is parametric design. This centres on automated through scripts that can identify the parameters within a design. By assigning those parameters, engineers can explore multiple options either by automation or manually.

Furthermore, once the parametric model is created using a visual programming platform, engineers can iterate options in seconds and the information can be shared visually with clients.

Sustainable priorities

Beyond software technology, structural engineering can utilise techniques to ensure buildings are designed and constructed efficiently and sustainably. These engineers are aggressively seeking low-carbon building materials to reduce the carbon footprint of the build environment. Advances in concrete technology are providing solutions in response to these goals, helping the construction sector work towards its target of net-zero carbon emissions.

In this area, embodied carbon has become a significant factor in minimising the detrimental environmental impact of structures. It can be defined as the carbon footprint of a building or infrastructure project before it becomes operational. This is primarily associated with the different life cycle stages: material extraction, manufacturing and production, construction, damage and repair during service life, and end-of-life considerations.

Buildings of the future - here are the 5 essential pillars

Okkie Momberg 25 Mar 2022

Being resilient

When it comes to the sustainability of buildings, resilient and redundant systems become a massive influencing factor. Climate change makes severe weather events much more likely, which increases the risk of flooding and wind damage. It is the responsibility of engineers to design with this in mind and future-proof buildings for any potential future events.

Aiding in this regard is concepts such as advanced model-based deliverables, integration of multiple services with core structural engineering, and using new materials and high-performance fabric.

Resilience also sees interest increase in how smart buildings can help in reducing the carbon footprint of people. Global energy utilisation concerns, as well as local ones given the precarious South African electricity grid, are major factors driving the need for smart building growth.

ABOUT THE AUTHOR

Faiyad Peterson, regional director: structures, WSP in Africa