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The Value Of Design Data, Surveying And Simulation In Optimising Cinema Operations And Creating Safe Spaces.

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About This Paper

Cinema operators around the world regularly face challenges which have the potential to affect the way in which they operate. From legislation changes through to security concerns, iterations to technology and even global pandemics, these challenges can have a profound impact on the profitability and efficiency of the entire cinema operation and the current Covid-19 pandemic presents new challenges never experienced before.

Whilst cinema operators are rightly focused on providing the best possible experience to their customers whilst showcasing the best theatrical content available, often overlooked is the importance of the most important asset, the building itself. Real-estate is undoubtedly the most important asset for any cinema exhibitor, yet often it's the element least well documented, invested in or looked at from the perspective of operational effectiveness.

This report aims to showcase the value in good design data, the requirement and benefits of interrogating both design data prior to construction as well as built environments prior to redevelopment and the value in using leading simulation tools to gain a deeper understanding the operational efficiency and utilisation of a building once complete and the role that simulation is likely to play in helping keep movie-goers safe once cinemas re-open post Covid-19. Sometimes, exhibitors and building operators fails to appreciate the value of data generated during the design and construction phases, beyond the cost of creating it. It may fall to architects to explain this better but, currently, there are enormous benefits being missed that for example, a fully-coordinated 3D-Building Information Model (BIM), can bring, and not only during the building-phase, but throughout the building's entire lifecycle.

The Value of Good Design Data

Architects are frequently asked by their clients how construction and, more specifically, design costs can be reduced without understanding the importance of good design data, not just in design and build but in ongoing operations.

Cutting costs invariably means streamlined or limited outputs, together with lost opportunities to ensure a better project from the outset. However, cinema operators continue to seek to differentiate and create compelling and exciting spaces, it is arguably counter-productive to cut-back at inception and the old adage: "If you always do what you've always done, then you'll always get what you've always got", couldn't be truer for those failing to grasp the mettle when it comes to investment in the design stage. This isn't to say that there aren't talented, inspiring and/or knowledgeable architects or construction professionals within our industry – ones helping drive better outcomes – but, too often, they appear stifled by budgetary constraint and/or lack of vision at the top of organisations when it comes to the importance of output. It's not about creating superficially-compelling designs: it's about creating blended-schemes that focus equally upon aesthetics and functionality as well as customer experience all the while whilst reducing risk.

Key Concerns in Construction Projects

Construction and/or major renovation of cinemas is an extremely costly operation and delivering projects on time and within budget is often essential in ensuring profitability is maintained.

Key considerations during the construction phase will often be:-

- o How to reduce risk during construction
- o Customer safety within the cinema
- o Improve performance of F&B offerings
- o Monetisation of space inside of the cinema
- o Ongoing management of the building and assets post-construction

A typical set of basic CAD drawings will help building owners and operators to allay concerns or to conceptualise outcomes. However, a fully co-ordinated BIM model shared among all parties in the design chain (from architects through to structural engineers, mechanical engineers, quantity surveyors and contractors) along with the application of specially-developed analytical tools that enable different scenarios to be examined and design-proposals can ensure that risk is managed and the building performance is optimised before the project even goes to site.

As cinemas increasingly shift from being viewed as places to watch movies, into large-scale multi-use entertainment spaces, gaining a better insight into the 'customer journey' has become ever more important. Visualising the space that movie-goers will occupy and understanding how they are likely to interact with the environment can be of enormous benefit, particularly for operators keen to ensure that every usable square-foot of space becomes monetised. However, above and beyond assessing design alternatives there remain substantial benefits, both in terms of operational cost-reduction and revenue-generation, in taking designs one stage further and creating simulated environments to assess the impact of design upon building-performance.

Interrogating Designs and Environments

Creating Digital Environments

The process for simulating scenarios is actually a lot less cumbersome than is perhaps first imagined. With the correct tools, knowledge and methodology, most design data can be turned into 3D digital simulated models along with the obvious time and accuracy benefits from importing 3D-construction models into a simulation environment, as opposed to using, say, 2D CAD drawings and trying to guess scaling of wall heights from plan views.

Capturing the Existing Built Environment

Often, there will be times when no up-to-date drawings or models exist for a site and, in such cases, a digital survey or 'reality-capture' can be utilised to obtain highly accurate digital data for a building and from which a simulation model can be created.

Reality Capture or Digital Laser Surveying provides a fast method of accurately mapping the existing context or environment, providing a cost-effective solution by minimising time on site and avoiding return visits. The survey produces millions of data points which create a point cloud which can be manipulated and enhanced to provide highly accurate 2D drawings and 3D BIM models. The resulting point cloud created can also be used to compare the as-built state with existing drawings or models to ensure that design data is accurate.

Once built, that model can then be used to run a number of scenarios, each centred around optimising the building's performance. In fact, some of the leading tools available to cinema today enjoy accuracy-rates of +95%; and so the question then becomes: where can such simulations be most useful?

Simulating Real-World Environments and Potential Designs

Security & Evacuation Procedures

Maintaining customer-safety inside the cinema remains of prime importance. In recent times lives have either sadly been lost or put at risk in cinemas around the world. Planning for emergency evacuation situations is often impossible and even with the best of training cinema staff can still be ill-equipped for every scenario. A walk-through of a well-prepared 3D digital construction model can much more readily identify issues using effective lines-of-sight, than can a set of 2D drawings, while offering provisions to ensure operators can maintain building safety or to iterate the design accordingly. In going further, moving the design into a simulation-environment can permit scenarios to be created that will identify not just what's likely to happen during an emergency, but also ways to ameliorate a given situation.

In a practical use example, one European exhibitor concerned about customer safety ran a series of simulations in a 12-screen multiplex, focusing on the evacuation of full auditoriums by firstly utilising all available fire escapes and then closing-off a series of exits to help identify any pinch-points within the building, along with where to position staff in the event of a needed evacuation. By closing off just three fire-exits, the simulation showed increases of more than 65% in the time taken to evacuate all 2,500 movie-goers from the cinema which, on closer inspection, identified the main cause of the time-increase to be directly attributed to a swell of evacuees using the central corridor along with a lack of suitable fire-exit signage for additional exits. The simple inclusion of additional fire-exit signage, when added to the simulation model, brought evacuation times not only back to original levels, but also reduced them by a further 20%.

Aside from the benefits of understanding how to provide improved customer-security, there are also potential financial benefits for exhibitors since, by eliciting documented and prepared evacuation-plans, in buildings that have been tested, exhibitors may be better-placed to negotiate reduced insurance premiums. Indeed, the above-mentioned exhibitor discovered the insurer was willing to immediately cut the premium by 15% and, following further work, would consider subsequent reductions based on enhanced building intelligence. The cumulative possibilities for a major multiplex cinema operator with many sites could result in profound financial benefits.

Digital Signage-Deployment & Lobby Experiences

In the majority of modern cinemas, traditional paper-based movie-posters have been rapidly replaced by digital and interactive-signage, designed to augment the movie-going experience while providing the additional marketing flexibility for advertisers, distributors and indeed exhibitors. Often placement of these and particularly in existing cinema-layouts, is constrained by convenience and electricity supply.

Understanding how to generate a greater return on investment from technology-digital-signage remains key. This requires an element of digital intelligence which factors in the customer journey along with the scientific element of understanding the position and content in relation to what is most likely to attract the human eye in any given environment. The ability to use design data, prior to a project, to simulate where the movie-goer will most likely be looking can help dictate the placement of digital-signage and, indeed, larger and more interactive lobby experiences can be used to increase engagement and lobby dwell-time, alike.

Retail and Lobby Optimisation

The ability to map the path of customers through the lobby also allows for concession-spaces to be optimised to improve revenue-generation while also providing a more positive customer-experience. Such optimisation can guarantee the smoothest flow of the largest possible numbers through the lobby space whilst also ensuring that queues and points-of-sale become carefully designed to reduce queue-times, which of course is even more essential when exhibitors provide a more diverse F&B offer.

In a further practical example, one US exhibitor had long noted that its concession sales at one of its well performing (in terms of box office revenue) sites both in terms of volume and revenue per head were beneath the average when compared to their other location and indeed that of their local competition. Prior to undertaking simulation work the cinema featured a large, long, open-style lobby with a large-sized concession area set back some 40ft from the front doors. With the majority of tickets being sold online, and fewer purchased at the combined box office/concession space, the simulation modelling suggested that many movie-goers would potentially seek the shortest path to the theatre doors and were likely altogether bypassing the concession area due to the size of the lobby. Acting upon the results of the simulation, the exhibitor constructed two side-seating areas aimed at channelling customers towards the concession area. Following a relatively low-cost investment in simulation and furniture procurement, the exhibitor noted a 5% increase in concession sales from the same number of box office admissions inside the first year, generating a return on investment in less than three months.

Cinema Operations in a Post Covid-19 World

Social distancing will undoubtedly have a profound effect on the way cinemas operate both in the short to medium term with potential for lasting measures. It is likely that necessary changes to operations to facilitate re-opening will affect all facets of the movie-going experience from ticketing, concession sales through to auditorium capacity and loading, safety and sanitation.

From a movie-going perspective, cinema operators will most likely be challenged to give careful consideration to their operations and in particular the impact of the customer journey in its entirety from elements such as ingress and egress, ticketing, queue management, pinch points, washroom usage and auditorium loading. As well as elements of the customer journey inside the building there will need to be a focus around temporary adaptations to the fabric of the building specifically hardware elements required to allow for re-opening whilst acknowledging the requirement for social distancing. These measures may include temperature checking stations at entrances in to the building, additional hand sanitisation stations, safety screens around the concession areas, partition screens and seat covers.

These changes are likely to significantly impact the typical operation of the building and create new and additional challenges including different and new staffing requirements. Simulating these new measures could also play a key part in reassuring movie-goers that cinema operators understand how to keep them safe as well as providing a level of detail required to authorities to allow cinemas to re-open.

Conclusion

Creating desirable environments that offer compelling physical and emotional experiences is at the heart of cinema. This starts with designing comprehensively and with the movie-goer in mind. That design element should not be restricted solely to the creation of new cinemas but also to renovations. A more concerted consideration in the design process, as well as closer collaboration between project-partners will ensure positive outcomes. Critically, it also means investing in rather than cutting back on design-costs, while also empowering designers and innovators to provide more input.

The financial benefits from simulation can be significant both in terms of optimizing the experience for the movie-goer but also for generating the maximum potential revenue. In a world that will be adapting as it emerges from a global pandemic where new norms will be established in the operation of public spaces (set against social distancing), understanding the impact of necessary changes could be essential.

Harkness' Expertise in Survey and Simulation

Harkness has been embedded at the heart of the cinema industry for in excess of ninety years. Our unique history and understanding of technology and the built environment has enabled us to assist exhibitors (and indeed their design teams) around the world to drive better outcomes from their new build and refurbishment projects. Harkness' global Reality Capture team possesses over 60 man-years' worth of experience supporting projects throughout the world using best-in-class surveying equipment, state-of-the-art design and simulation software and methodologies unique to Harkness and the cinema market.

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