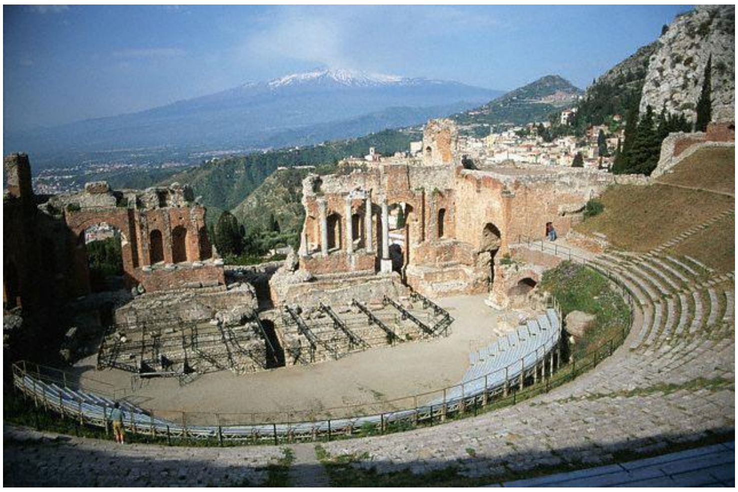
Fig1. Theatre in Taormina

Dating back as far as to 500 BCE, theatres built in the city of Athens have played an important social and diplomatic role, being one of the main methods to display the arts to the masses, and to other neighbouring countries regardless of their diplomatic relations. Ancient Greece is widely recognized for their highly developed education system, political structure, military power, arts and architecture. It is noticeable that their advanced knowledge of stereotomy, physics and geometry was applied to the designing of the ancient theatres. They usually built theatres on the hillside, using the naturally occurring slope to organize the semi-circular seating in a way that optimized the viewing and hearing experience. Before aesthetic architectural elements such as paintings and frescoes became popular, the Greeks designed their theatres to take advantage of the surrounding landscape, allowing the natural features to act as a backdrop and create a moving experience for the audience. The fine stereotomy techniques they used to build their cities and phenomenal buildings such as the Parthenon and the Pantheon was applied to the designing of theatre components, including the performing stage, seating, and stage building. Just as the ancient Greeks applied their archaic building technology to the design of their theatres, the rise of new technologies, both architectural and in general, has a profound impact on the design of modern-day theatres as well as on their conceptual development in the future.

As soon as architects and engineers discovered the merits of steel in building construction, they have never stopped seeking new ways of using this technology to realize architectural concepts. However, possible applications of steel were impractical at the time due to the high cost of processing. It wasn't until 1850, when Henry Bessemer invented a way of mass production, that steel became popular as a building material.[1] Today, steel is not only a more cost-effective construction material, but is also one of the most versatile due to

Fig 2. Rendering of the lobby

its ability to be bent, cut, drilled, melted, extruded, rolled, etc. In some countries, it is an even more economical material than concrete. Steel construction also gave architects greater freedom in designing increasingly complex buildings. Visionary architects such as Daniel Libeskind and Zaha Hadid have consistently pushed its construction capability to its fullest with their lofty designs. In restoration and renovation efforts for aging theatres, steel is favoured by many architects and engineers for its ease and brevity of construction. In general, steel provides longer spans with lighter self-weight compared to concrete; even greater spans can be achieve using different techniques such as an open-web steel joist system.[2] In our project, we felt that steel's inherent durability, versatility and lightness all allowed for a much better theatregoing experience. While the design of the armature is not too challenging in terms of construction, it is only achievable through the use of structural steel members. The steel armature bleeds into the streetscape around the theatre in an interesting organic form to engage more with the public and enliven the neighbourhood. An existing small passageway outside the church was converted into the lobby of the theatre, resolving the relationship between the existing building and the new addition by harmonizing the two. A non-structural armature in the same style inside the church is composed of lighter and smaller members of hollow steel-section, which are lighter and better at displaying one large, continuous image.

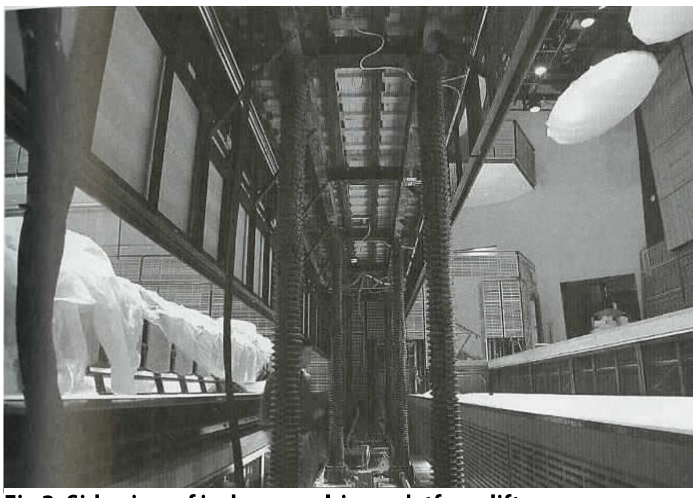

Fig 3. Side view of jack-screw driven platform lift.

Steel is an example of how materiality can affect the design of architecture and theatres. It should be noted though that the invention of new materials is not the only contributing factor in the rapid development of theatre design. When diverse materials were available to architects and engineers, they started inventing new

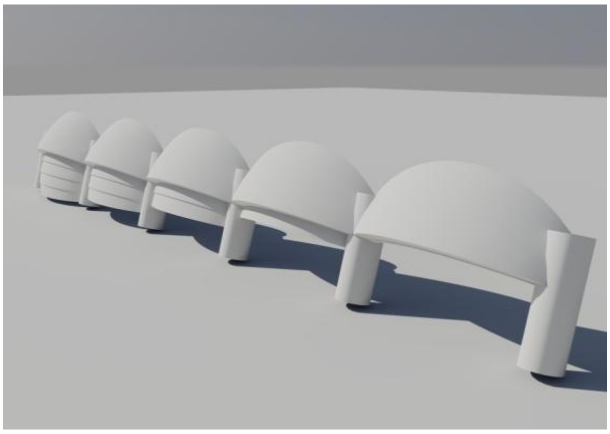

Fig 4. Convertible wall.

mechanisms out of those materials. One example is the jack-screw driven lift used in the Judy and Arthur Zankel Hall, by Polshek Partnership, in New York City. The nine platforms which support the rows of seats can be reconfigured to change the layout of the theatre between proscenium stage, traverse stage and open space.[3] The active strategy jack-screw lifts offer a concept of flexibility which by no means can be achieved through passive strategies. The rows of seating in the theatre rise or lower themselves depending on the use of the theatre. Another successful and commonly used mechanism is seating that can be retracted to one end of a room to provide a large open space which usually can be found in public school gymnasiums. Although all these ideas were considered during the design process of our project, the unique courtyard space to the north of the church required us to give thought to the relationship of the building and the courtyard. Therefore, we decided upon the installation of a special wall that can be lifted to reveal an opening to the courtyard. This convertible wall allows for greater flexibility of use and interaction between exterior and interior. It could even be opened to provide thrust stage, allowing the audience participation in the performance in three directions. In inclement weather, the wall can be kept closed, allowing for a more intimate relationship between the audience and the theatre.

Fig 5. Transparent AMOLED display.

Apart from the two forms of architectural technology mentioned above, electronic technology played a large role in influencing theatre design as well. When Thomas Edison invented the light bulb, he did not simply invent a better way to light homes; his invention would pave the way for architects and engineers to discover new methods in lighting large public spaces such as theatres. Electric lighting was far brighter than traditional gas and oil lamps, yet had none of their drawbacks.[4] Spotlights could be focused on the actors and actresses, enhancing the clarity of their actions and expressions. It revolutionized the way audiences experienced the theatre. Moreover, improved lighting afforded theatre-goers with better views of the interior.

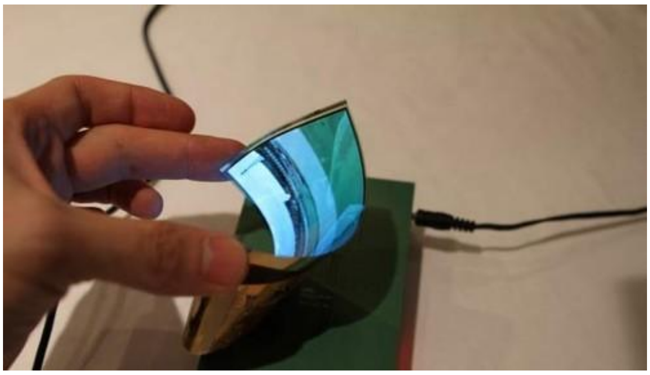

Fig 6. Samsung Flexible and Transparent AMOLED Display

Fig 7. Great Court at the British Museum

Wall paintings and frescoes became more practical and effective under controlled lighting. In time, the use of microphones and speakers also enhanced the acoustic experience for the audience. Nowadays, increasingly advanced technologies such as image projection and computerized lighting contribute to make modern theatres truly technological venues of entertainment. Another key aspect in our project is the display film that fills the honeycomb-mesh HSS armature installed inside the theatre and courtyard. Developed by Samsung, these displays are transparent, flexible, and waterproof.[56] These space-age screens will replace the traditional paintings and frescoes that provide a special kind of atmosphere found nowhere else. For performances such as music concerts, the screen can be used to display special effects to enliven the concert experience even greater. One of the precedents that helped us in furthering our idea is the British Museum, designed by Norman Foster. In contrast to the museum, our building uses hollow-steel sections over solid rigid steel members, because all the necessary electrical wiring for the display films can be contained within the HSS members. With proper designing strategy, even the drainage plain that is necessary for the outdoor armature could be placed inside the HSS as well, preventing from undesired possible rain stains.

It is evident that the design of theatres developed in parallel with the emergence of new technology, including the invention of new materials, mechanisms, and electronics. Experimentation and conceptualization will ultimately shape the next generation of theatre design. Considering past and present trends alike, envisioning new concepts, and proposing bold ideas are critical efforts that will push the realm of architecture and design into the future.

[1] Cory Zurell, ―Arch 362-Structures for Large Buildings", University of Waterloo, p. 18

[2] Cory Zurell, ―Arch 362-Structures for Large Buildings", University of Waterloo, p. 66

[3] Hugh Hardy, "Building Type Basics For: Performing Arts Facilities", New Jersey, John Wiley & Sons Inc., 2006, p. 45

[4] Hugh Hardy, "Building Type Basics For: Performing Arts Facilities", New Jersey, John Wiley & Sons Inc., 2006, p. 47

[5] News Samsung, http://www.samsung.com/us/news/newsRead.do?news_seq=3678

[6] News Samsung, http://www.samsung.com/us/news/newsRead.do?news_seq=19836

Fig. 1 – Home Away Vacation Rentals, http://www.homeaway.com/vacation-rental/p403609

Fig. 2 – Lobby rendering of ‗Veiling Nebula'

Fig. 3 – Hugh Hardy, "Building Type Basics For: Performing Arts Facilities", New Jersey, John Wiley & Sons Inc., 2006, p. 47

Fig. 4 – Convertible wall rendering of ‗Veiling Nebula'

Fig. 5 – Oled-Display, http://www.oled-display.net/samsung-mobile-display-show-world-largest-transparent-amoled-display

Fig. 6 – FGadgets.com http://fgadgets.com/future-gadgets/samsung-flexible-and-transparent-amoled-display

Fig. 7 – Foster + Partners http://www.fosterandpartners.com/Projects/0793/Default.aspx

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