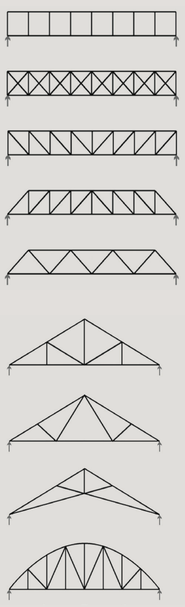
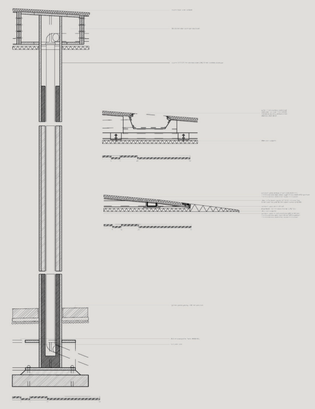
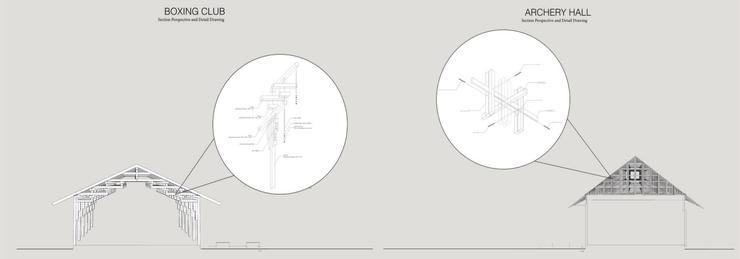
MS01. Vector Active Structures

The implementation of Vector Active structures emerges with the ability to transform the spatial environment however maintain a high level of normality and architectural design. The capability for intense strength due to interlocking, joined horizontal beams that distribute the intensity of potential loads, whilst remaining either hidden or exposed. The utilisation of vector active structures can vary in potential size and joinery components. The capability to have joinery such as hinge joints, ball and hinge as well as hinge and pin joints allow for a plethora of variety within the implementation of structural spaces which ultimately illustrates the dynamicism of vector active structures.

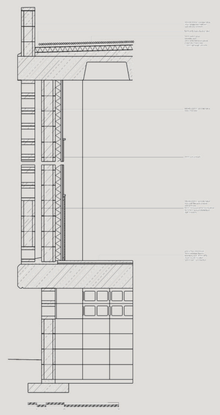


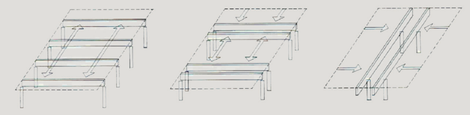


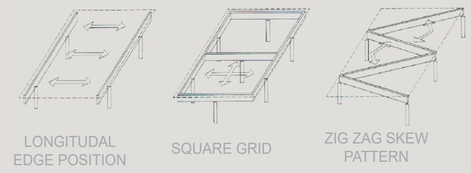


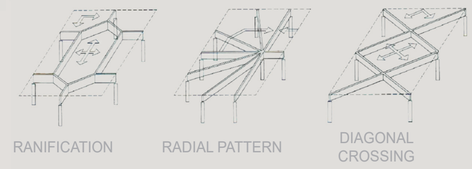
The main elevated roof truss for both the Boxing club and Archery hall were made from locally sourced timber. The intial objective of this was to bring a sense of traditional exhibition into a space, whilst utilising the given space on a budget given by the university. The joinery utilised for the space was derived from uncommon practices of traditional architectural building, where the use of smaller joinery aspects and continous repetition for a large building aspect was uncommon. The boxing club roof, in order to save upon the budget used intially defective wood as a result of insect damage, however the roofing configuration had to be accurate and precise in order to achieved the desired architectural and structural responses. The Archery hall specifically contains thicker vertical timber pillars that are split through the vertical and horizontal axis. The utilisation of this intricate cut is to allow the horizontal thinner timber coloumns to be able establish a joint within the vertical timber, effectively sloting into place. This allows for a traditional feel whilst containing cost effective methods of joinery. This ritualistic significance was highlighted as being dis-associated with the onset of Japanese Modernism and represented a physical manifestation of traditionalism. The Boxing and Archery hall both contain completely timber framed vector active compositions as structural support, however specific sections require the attatchment of metals through bolts and joinery in order to maintain the strong join between wood sections. The addition of a repetitive frame further allows for structural consistency throughout both constructions, whilst allowing for a transparent effect of continium.

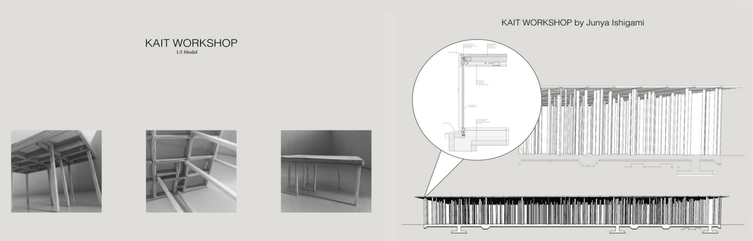
MS02. Section Active Structures









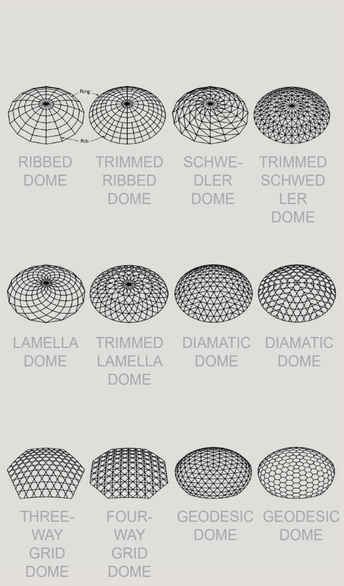


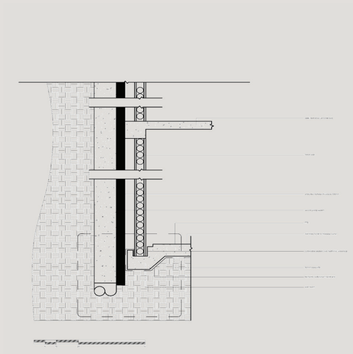
The Kanagawa Institute of Technology represents an expansive, institution that has no identifiable exterior walls which illustrates a connection between architectural design and the immediate environment. “The places are created tg be at all times open to the whole- the one room spreading out over 2000 square meter and at the same time to each have it’s own individual largeness and sense of distance. One who experiences this space can instantly see how, despite the lack of identifiable boundaries, each place has its own distinct expanse” (Ishigami 2008:28-29). Through this perspective of expansive architecture, the implementation of a section-active concept has allowed for the specific placements of various coloumns to become possible, which both increase the structural integrity of the structure and allow for pathways to be created through the process. The load being distributed is also represented as a flat continued slab, which allows for the building to stretch an expansive space as long as the coloumns continue. This representation of architecture in abstraction illustrates the potential and power of section active, horizontal spaces whilst emphasising the difference between normal flat architectural style and abstract, engaging architecture.

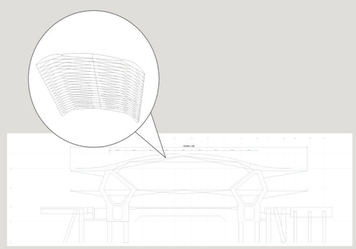
The representation of section active structures reflect the density and rigidity of a designs structural integrity. The utilisation of linear vertical coloumns and horizontal beams allows for interlocking, strong material that can distribute loads effcieny. The materials associated with section active structures, are often the utilisation of concrete of steel through either exterior or interior reinforcement. section active structures show the utilisation of potentially specific placed beams to create an expansive horizontal space that allows for full use of more space. The utilisation of the furnicular shows the potential for these loads to distributed allow a curved roofing form, ultimately displaying the early point form for differing roof structures.

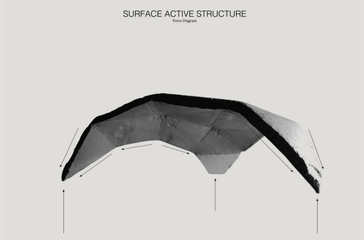
MS03. Surface Active Structures

The utilisation of a surface active structure shifts away from normaility when implementing rigid and non flexible materials. The architectural strategy behind creating these spaces is manipulating the skeletal framework, being steel, timber or concrete to create a curved, folded or arched plane. The interior representation may display subtle shift in angles, however the material overlayed creates an ultimately smooth, curved shape. Overall the form and static load of a surface active structure is self supportive with multi-functional use and manipulation of design. Although this is true, the overall design application is considerably more difficult then a section active alternative, by a desired design perspective can be achieved.

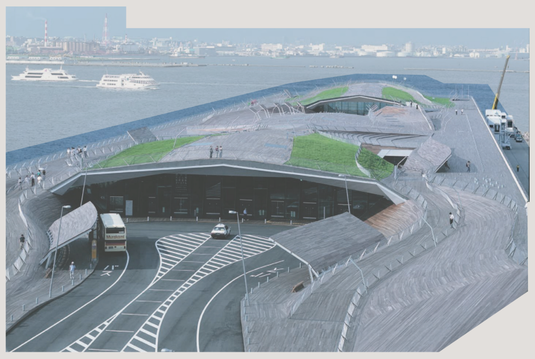








The Yokohama Passenger Terminal illustrates the dynamicism and manipulation of space when applied with surface active structures. The underneath passageways with shell forms above contain upper folds throughout the structure, whilst containing a variety of these forms in order to direct passenger traffic and increase the circulation throughout the space. “The terminal is designed by using a number of complex surfaces through the circulation diagram in the section of the building that forms moderate curve and fold to achieve the idea of continuity within this inhabitable architectural topography. Also, by looking down from the observation deck, the wave-like oscillations can be seen due to the elevation of the floor. This pattern creates passageway and openings into the massive and enclosed spaces below”. The application of these above shells allow for further static structural stability to be added to the whole terminal stretch, whilst being utilised as additional upper space for traffic to walk to and from both ends of the terminal. The overall architectural design of the structure is considered to be a representation of the power of post-modern and potentially future architecture. This is achieved through the full, complete utilisation of space from various levels and dimensions. The design is also considering all aspects of practicality including circulation, movements paths, sun movements and functunality as a passenger terminal for some of the largest passenger ships in the world. This is all achieved through the unique surface active approach and illustrates a large application of this concept.



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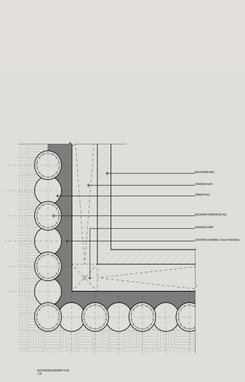
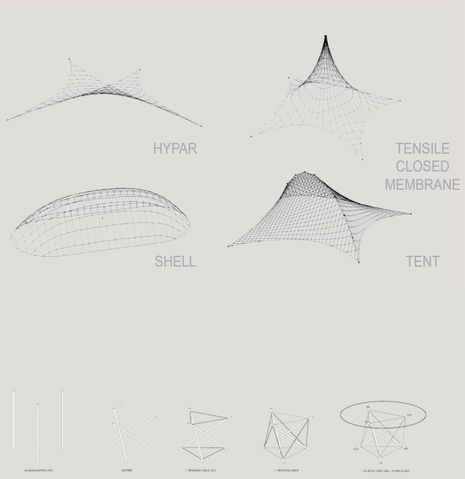
MS04. Form Active Structures

The utilisation of Tensegrity and Tensile membranes throughout the modern infrastrusture and architecturehas composed structures that illustrate value through mutliple facets of representation. The intial application of design aesthetic and desired look can be achieved, whilst allowing for the permeation of functional use through multiple faceted layers, including light through transparency and translucency, environmental reflection or protection as well as the elimination and disposition of walls or primary joinery to support the structure. the facets of construction aren’t restricted to the necessity of conventional architectural utilisation of raw materials and layering of metal beams and structurally integral components but lighter, more efficient materials can be used to have a much larger effect whilst illustrating un-restrictive design elements.





The Rosa Parks Transit Center has layered composition of tensile membrane layouts with consistent repetition 7 times over the length of the below structure. The composition of the structure relies on the concept of tension and lightweight material to form the above canopy. “To create rhythm, the proposed scheme was broken down into seven repetitive bays, each approximately 110’ long and 50 ft wide. Each bay is comprised of two trusses, an A frame and fabric which is pulled down, transforming the roof into a wall and encompassing a courtyard.” (Hoque. P. 36). The encompassing range of the above roofing allows for a budget effective ($22.5 Million USD, FTL Design Engineering Studio) solution that protects the traffic below through rain and wind cover, whilst providing essential sun blockage over the space. The use of an exterior membrane further eliminates the necessity for conventional architectural loading structures that would typical be necessary for weight distribution or large overhead structures that completely block the permeation of natural lighting from entering into the station, which the membrane allows for. “FTL developed a design approach that uses flowing canopies to create an active visual space and naturally day light space which challenges the conventional notion of roof where the membrane both hovers 50 ft in space, and in other areas brought to ground and to act as a giant water collector”. (Hoque. P. 37). The utilisation of this detail throughout the membrane and connective trusses are illustrated clearly throughout the representation of the model. The consideration of materiality and spatial configuration represent clearly the mechanics of how the membrane function and ranges over a space. The utilisation of durable PTFE membrane with truss and cord supports allow for a budget effective, environmentally protective and multiuse roofing solution which challenges the necessity for convential architectural roofing. The use of a tensile membrane further allows for less structurally impeding necessities such as walls or structural joinery to increase the flow of traffic and becomes imperitive in illustating the power of large overhead membrane canopies used within the public context to both convey translucency and durability.