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DIGITAL CRAFT

Understanding generative architecture

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The architectural form generation has been an enigma since form as an approachable entity was identified with -effortless separation and dependence of- art as well the precise science of it [form]. Developments in the digital technology is now offering an engagement in form making that negotiates many different realms of design – structure – construction – crafts, etc. Digital technology as a creative tool conceives itself as a complete process right from the ability to formalize the design to actualize the form. "*Digital Crafts: Understanding generative architecture*" was a twenty day intensive winter school workshop 2013, at CEPT University, Ahmedabad, India. It aimed at introducing the vision, tools and techniques to create multiplicity in form making through generative designing and offered an opportunity to work with digital fabrication techniques.

To initiate, computational proficiency was elucidated through examples of built projects. Writing small pieces of scripts using Grasshopper induced logical thinking required for algorithmic designs. For the given volume of 3 x 3 x 3 mts^3, a variety of forms were generated. Selection criteria for design development were based on installation and outlay. Two models were developed simultaneously, one based on Free Form Geometry and the other based on Sectioning as construction logic. This paper focuses on the success of the former approach.

Options of complex forms generated in Rhino were required to be simplified for assembling in short time. Students developed a ceiling suspended funnel shaped installation, inscribed in 4 x 2 x 3.5 mts^3. Mapping of hexagonal grid (75mm high) was used to understand mass customization and structural tessellation on the free form. The tensile form consisted 300 unique hexagonal rings at specific locations in the structure. Due to limited time and exposure to students on computation, model was not digitally analysed for structural stability. However the design was complimented by testing it on a scaled prototype. At this stage the approach was similar to the earlier experimented form finding approaches. Each ring was unfolded for scaled prototype (1:5) as well as actual fabrication and unique numbering system was adopted to identify particular hexagon in its location as well as its connection to six other sides. Material choice of 1mm thick MS sheet metal was based on two criteria- firstly, it should be single unfolded element per ring and secondly, its ability to take tensile force at any point. After all the pieces were laser cut and numbered, manual folding and riveting was done at the workshop. After this, craftsmen were involved to assemble and erect the structure. To achieve the form Even though each hexagon ring was imprecise, due to the nature of close packed structural tessellation of placing one piece after the other while connecting them in boundary condition, it was possible.

To conclude, form finding has tangible results, which makes it easiest to perceive at first experience to generate designs. Yet the other potentials of computations are to be explored in the context. The project demonstrates generative design and computation makes form-finding approach by masters much easier and time saving. It established an example of mass customisation through structural tessellation as well as customised processes that synthesize computation, materiality, experience and craftsmanship in Indian context.

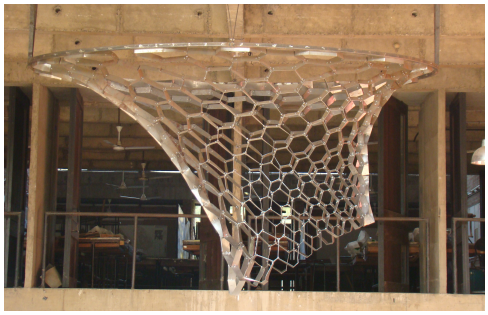

Figure 1. As built structure