

Attributes for a Congruous Architectural Model

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ABSTRACT

Now a days, architects and architecture students avoid using physical handmade models though it is a widely accepted and most prominent tool to understand and explain architectural design concepts. Physical handmade models play an essential role in converting conceptual ideas to working and working levels to design finalization and presentation for architectural design, structural design, interior design, and product design. Availability of inadequate skill to make models, excess time consumption, extensive effort, cost of model making materials, lack of knowledge about suitable material, lack of know-how about model making tools force the students of architecture to avoid using the physical model to explain or understand design. Any single model may not be appropriate for all the requirements. Each model needs to have a particular goal. The architect needs to finalize the scale, material, and tools with proper scrutiny to achieve the goal. To prepare an appropriate model for a particular purpose, one should have a thorough knowledge of model making skills or techniques, a sense of proportion, materials, tools, finishing materials. In certain times and some areas, suitable materials may not be available. In that case, the architect has to improvise and create materials using printers and using other tools. This paper discusses steps to prepare a model, criteria for selecting material and tools, and strategies to prepare an appropriate model.

Keywords- Physical Model; Architectural Design; Structural Design; Skill; Appropriate.

I. INTRODUCTION

The physical model allows the client and designer to understand the design's scheme, elevation, and perspective. It also helps to understand the volume and construction system [1]. It is not only for the presentation purpose, but it is part of the design process. It helps the architect to understand the volume and construction style, and structural system of the project. It gives freedom to the architect to think abstractly and check with stability. If physical models combine with the 2D drafting of the design, it can give a comprehensive understanding of the project. Architects and Planners often use architectural model tools to express or communicate building design ideas, master plans, etc. Architects' physical architectural models are universally accepted by private clients, real estate developers, private companies, government authorities, etc, due to their wide acceptability and tangible aspects [2]. Before going into the final

architectural design presentation, the Physical model helps Architects to stimulate creativity, understand volume and functionality, construction style and structural members. Working model is useful to understand the building services. To fill texture and experience the mass of the building physical model is the only option. Physical model is helpful to solve the unseen problems in construction, service, and structure. client and other stakeholders can also understand the design process with physical models and give their input in the design process of the build environment. With a physical model Architect can experiment with the form material and context. Architectural model can be classified as conceptual model which is the initial thought of the Architect about volume and form in response to the climate and socio economical aspect. Design development stage models which are the part of design development stage. In design development stage models Architect tries to implement Anthropometry, building

services, construction techniques and structure system into the physical model. Presentation model is a final physical model of an Architectural project; it comprises complete architectural detail with material texture. Purpose of the presentation is to convey the design ideas to the client [3].

1.1 Heading Background Study (History of Architectural Model)

Since prehistoric days, models have been an integrated part of the architecture. The model of Tarxien Temples in Malta is considered the oldest model displayed now in the National Museum of Archaeology in Valletta. Models were in demand by the kings and princes and are collected by British Museum and architects like Francois Cassas [4].

1.2 Types of Architectural Model

Before going into the final architectural design presentation, the Physical model helps Architects to stimulate creativity, understand volume and functionality, construction style, and structural members. A working model is useful to understand building services. To fill the texture and experience the mass of the building's physical model is the only option. Physical models are helpful to solve unseen problems in construction, service, and structure. Clients and other stakeholders can also understand the design process with a physical model and give their input in the design process of the built environment. With a physical model, the architect can experiment with the form material and context. An architectural model can be of different stages. A conceptual model that is the architect's initial thought about volume and form in response to the climate and socio-economic aspects. Design development stage models are part of the design development stage. In the design development, stage models architect tries to implement Anthropometry, building services, construction techniques and structure system into the physical model. Testing model to test the efficacy of the building with respect to earthquake, wind speed etc. Presentation model is a final physical model of an Architectural project. It comprises complete architectural detail with material texture. Purpose of the presentation is to convey the design ideas to the client [5].

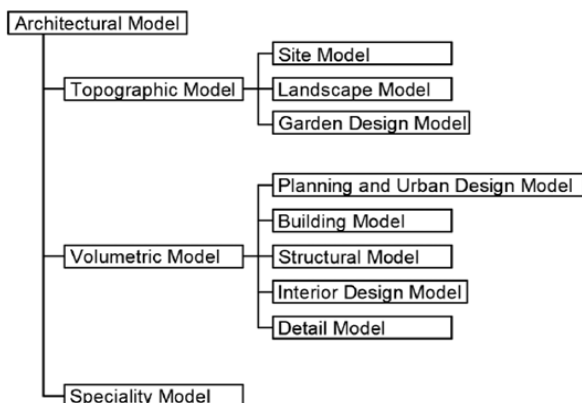


Figure 1: Types of Architectural Model [5].

1.3 Why Architects Stopped Model Making

However, professional architects and students of architecture do not prefer to prepare model as it is time-consuming, expensive, and lacks the skill available to prepare model as per requirement. Virtual models, which are used as an alternative to the physical model, is a quick and cost-effective technique too.

II. STEPS TO MAKE MODEL

Physical model can be made with hand techniques, laser cutting and 3D printing [6]. To make a physical model with hand techniques, it needs to follow needful steps.

2.1 Finalize the Purpose of the Model

The first step to start the model-making project is to find out what the goal is. What type of model, the purpose of the model, the time & resources available to prepare the model & what is required to be communicated through this model will help decide scale, material etc. In many cases, people may not have the budget and resources to prepare the model to show all aspects of the building. In that case, it will be more practical to choose the most crucial aspect which model can communicate.

For example, to show a housing design, a monochrome model can show design lay-out and how it sits in context, giving the client a general understanding of the project. The detailed design, color, material, and any other detail can be explained through additional drawings, 3d views, and photographs.

Another approach can be the design lay-out and context will be shown in the drawing. An architectural model can show the interesting part of the building entrance features, decorative elements, or a sectional model that slices through the building can be used to show the internal spatial organization.

Finalizing the apparent purpose of the model and working out the model will be befitting to achieve the goal in the best way possible.

2.2 Selection of Scale

In an architectural model, the scale is the ratio or relative size of the model to the real object. If the scale is 1:1, then it is a life-size model. Where the scale is 1:10, the model size would be one-tenth of the actual model, and if the scale is 1:100, it would be one-hundredth of actual size. On a larger scale, indicating the large number, the size of the model will be small. The amount of detailing required helps to decide the scale of the model [7].

The architectural model needs to be prepared in a proper scale to interpret anything by visual simulation. Selection of scale is the second step in the model making after deciding what to communicate through the model. The selection of scale depends on two things.

- Area of the site for which model is required
- How much detail is required to show?

As per the type of model and its purpose different scales are used to make the different models.

Topographical models used to show site and contours, can be built in different scales starting from 1:2500 to 1:50. Building models can be prepared as per the architectural building design at a scale of 1:2000 to 1: 200. At scales between 1:200 to 1:50, the models can be shown without any context. Structural models are executed at scales from 1:200 to 1:20. Interior models are used to show the interior spaces, either single or series of spaces. The scale used to build the model is 1:100 to 1:20. Specialty models are helpful for product design or the design of objects or furniture. The scale of the model varies from 1:10 to 1:1.

2.3 Preparation of Drawing as Per Scale

Scale model in architecture used for exploration of form, showing details, and planning strategies. By preparing drawings as per scale, the model maker gets an idea about the volume of the model, which guides him to select the material, tools, and finishing materials. For physical models, all project surfaces drawings need to be drawn depending on the types and purpose of the model.

2.4 Preparation of Model Base

To decide the base's size, consider the following aspects: site and its surroundings, purpose, modes of transportation, materials used, etc.

2.5 Selection of Material

Selection of Material is the next step after the decision on the scale. While selecting material, a few things are required to keep in mind. The purpose of the model, level of finishing, strength of material, durability, availability of material, availability of cutting tool for the material, time available for preparation of model etc. Paper, Card stock, paper board/clip board, wood, foam, plastic can be the material for the model.

2.6 Preparation of Model Base

To achieve proper finishing, model making tools play a major role. Selection of tools depends upon the type of materials used in the model and scale of the model. The amount of detailing required in the model also influences the selection of tools.



Figure 2: L-square [8].

L-square can be helpful in fix model corners perpendicular. One side of L-square consist of measuring scale which can be used for measurement. Both plastics and steel scales are available of small and large sizes to work on different sizes of models.



Figure 3: Scalpel [source: author]

Scalpel is a small and extremely sharp bladed instrument used to make miniature models. Re-usable scalpels can have attached blades that can be sharpened, or removable single-use blades inserted into a handle. Disposable scalpels usually have a plastic handle and are used once, then discarded.



Figure 4: Basic Knives [source: author]

Basic knives are used to cut paper with precision. They are available in a wide choice of models, shapes & sizes. For detailed models to give proper finishing basic knives can be used to cut the materials like mount board and balsawood. To give a different edge finish, 10 blades have provided.



Figure 5: Wooden Knives [source: author]

Wooden knives can be helpful to cut balsa wood and other hardwood and carve sculptures with them.



Figure 6: Acrylic Cutter [9].

Acrylic specialized cutter can be used for acrylic sheets of different thicknesses. Acrylic blades are bent and pointed to increase the pressure on the acrylic sheet to cut it easily. Instead of making the primary model to protect other models and keep it safe, acrylic covers can be cut and finished by the acrylic cutter.



Figure 7: Glass Cutter [source: author]

Glass cutter is used to cut glass cover to display and protect the model and keep it safe. Diamond is fixed on the edge of the cutter to cut the glass in different shapes.



Figure 8: Circle/Compass Cutter [source: author]

Circular Cutter (Hand Wheel Type) is a manually operated cutter with four knives along the perimeter. Circular and semicircular shapes can be cut with Circle/compass Cutter.



Figure 9: Circle/Compass Cutter [source: author]

Hot wire cutter is used to cut thermocol and Foam board in different shapes and form. It is very useful to make history and monumental model.



Figure 10: Wire Cutter [source: author]

Wire cutter is used to cut wire in different shapes.



Figure 11: Precision Cutter [source: author]

Precision Cutter is used to cut minute detail. Details can be created in balsawood, Foam board etc.

2.7 Selection of Finishing Material

Finishing is one of the prominent parts of presentation models. It is used to give a realistic look to models using materials.



Figure 12: Material for Texture on the Wall [source: author]

Finishing material for wall cladding can be shown with texture paper or printed paper for realistic view.

III. STRATEGIES FOR EFFECTIVE MODEL MAKING

3.1 Selection Experimenting with New Materials

New model materials like metal and POP can be used to give a realistic look to the model.

3.2 Selection Integration of Technology and Handmade Skill

New technologies like Laser cutting and 3D printing can be integrated with the handmade model and quality of model can be enhanced. Laser cutting improves the quality of the model and 3D printing improves the quality and speed.

3.3 Use of Readymade Objects

Readymade objects with proper scale can be used for fast completion of the model. Readily available building blocks, Human figures, vehicles, lamp post & trees may be used to for completion of the presentation models.

3.4 Use Integration of Handmade Sketches and Software for Creating Finishing Material

Finishing is one of the prominent parts of presentation models. It is used to give a realistic look to models using materials.

3.5 Use Comparison of the Handmade Model with The Virtual Model

"The physical handmade architectural model helps develop ideas and concepts and improvise as per the design requirement or site constraints. It is an integrated part of creating the preliminary concept and design finalization process the architects want to reach. It is not just a finished product that may be on display just at the end only. It is to draw using cad software or develop virtual 3d, which may impress the client, but not possible to get an idea about scale, proportion, material without making a physical model by the architect." [4].

3.6 Use of Model in Contemporary Architecture

Models are helpful to understand the environment and scientific testing of the building. For example, wind tunnel test, which is a method to understand the effects of wind on building and building on wind flow in surroundings, cannot be done without a physical model. DE constructivism Architect Frank Gehry starts his work with a conceptual model, which gives him the freedom to play with form.

IV. CONCLUSION AND FUTURE WORK

As a model-making tool, a physical handmade model has an advantage over virtual models due to its tangible property. Nowadays 3D printers replace physical handmade models in a few areas, but it is expensive

compared to handmade models. Though 3D printers can be an option, understanding concepts and developing hand and brain coordination with handmade models are better than 3D printers. The time consumption to do handmade models can be reduced by the amalgamation of laser cutting with the handmade model. Having the right idea about scale, materials, and tools can be helpful for preparation of a physical model which is the best medium to explain or understand design concepts.

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