VIRTUAL MODELING OF ARCHITECTURAL SPACE
Elena Barchugova, Natalia Rochegova
Moscow Architectural Institute

Abstract
The professional perception of the architectural space characterizes the most advanced level of the architect’s mastership.

In the article the virtual modeling is regarded as an effective way of forming the professional perception of integrity of architectural space. Computer technologies bring together bi-dimensional and three-dimensional languages of modeling and thus they help the procedure of movement of consciousness from the plane to volumetric images and back to the visual and mobile. They help to carry out the level-by-level analysis of the multilevel structure of an architectural reality in the mode of active dialogue. The process of interaction of consciousness with the model becomes accessible to studying. There appears an opportunity to manage this process with the aim of forming perception.

The word collocation «virtual modeling» has become today a synonym of computer modeling. Digital models are the least material among all possible physical ones, but nevertheless they are visual and convincing. The dialogue between consciousness and the computer model is dynamic. The model is easily changed and allows making thousand manipulations with itself, at times not predicted from the point of view of traditional modeling. Probably that is the reason why computer modeling has deserved the term "virtual", i.e., "real".

Process of modeling of architectural space assumes firstly purposeful, selective perception of a reality at the level of mental images, and secondly, realization of these images into physical and virtual models. Adequacy of perception of architectural space is based on the advanced spatial imagination of a specialist.

The means of forming spatial imagination traditionally are represented by all kinds of reflections of the reality: from bi-dimensional images (an illustration, a diagram, a drawing, a photo, etc.) up to three-dimensional physical models. With the computer technologies we have received one more version of reality modeling - virtual modeling.

On one hand, computer technologies erase borders between bi-dimensional and three-dimensional modeling, on the other hand, they (technologies) allow to subject the process of transformation of one kind of modeling into another kind to steadfast studying. Mechanisms of interrelation of bi-dimensional and three-dimensional modeling are of indisputable interest as means of active influence on the professional perception.

The geometrical aspect is obvious: the two-dimensional image is a projection of a three-dimensional object to a plane. But this projection can contain not only the information on the geometry, but also on the function, on the image, on the volume and spatial plan. Depending on the given task it can inform on any of the aspects of architectural integrity reflecting planning, functional, constructive and other properties of the environment and the object in the forms of projections, schemes, symbols.

Methods of parallel work with two- and three-dimensional models have been known for a long time and are widely used both in the educational process, and in the real practice, as a layout and graphic method. Today this method is used together with the virtual method. Besides, virtual modeling makes the process of interaction of consciousness with the model visual and consequently accessible to studying. It also represents it in the most detailed form. In result there appears an opportunity to manage this process, to actively influence the formation of professional perception.
The complete image of architectural space consists of many parameters. Its volume and spatial analysis is carried out at levels which can be united in three basic groups:
- conceptual - substantial;
- functional - technological;
- structural - tectonic.

Free movement of consciousness within this or that level can be represented as the combinatory development of fields of possible decisions. We have addressed the architectural combination theory as the tool that structures out the process of perception and modeling.

The usage of combinatory methods gives the idea of the multi-variety of answers to the task in view, it arms us with methods of active work with the architectural form and acquaints us with the multilevel structure of the architectural space. Before the computer technologies have come to assist, it was problematic enough to trace processes of modeling made at separate levels. Virtual modeling allows presenting them as a consequence of visual procedures.

Each procedure is the cycle consisting of two operations: generation of the set of variants and choice of the one from them. We fill a combinatory field with the first operation, varying one of the parameters of the task. By the second operation we choose the best of the received results, basing it on the general statement of the problem. It is possible to return to change the initial ideas in the following step of the cycle.

For example, while interpreting the plane image into a volumetric one, we can receive an uncountable set of answers. The consciousness is working at the morphological level. Only ideas of the harmonious structure of the newly-created abstract volumetric compositions serve as restriction of a combinatory field.

The procedure of choosing the individual answer out of the received variety has different criteria lying in the level of associative sensations and images returning to integrity of the estimation of the architectural form.

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As soon as the statement of a task becomes complicated and there are many combinatory cycles, there is a necessity to introduce the training procedure where in a simplified way the essence of the combinatory actions leading to the reception of a set of answers to the given task is explained. Thus in case of absence of an initial plane image, work at the morphological level follows the studying of combinatory opportunities of a flat figure and serves as warming up.

Work with the received set passes to a morphological level by plastic interpretation of heterogeneity of a flat figure. The borders of plastic search are contours of the graphic scheme. The number of possible interpretations is limitless. At transition from the plastic decision to the volumetric one the spatial component is stressed.

The combinatory cycle of the decision of a problem is finished by interpretation of the received volumetric and spatial decisions in an associative architectural image.
The procedure of warming up on the one hand helps to liberate the creative potential inherent in each human consciousness, giving the experience of productive activity. On the other hand, the warming up toughens criteria of selection of the final decision. They become deeper, more serious, more fundamental, i.e. more professional.

The more complicated the problem is, the more combinatory cycles connected with each other a trained person passes.

The process of designing (modeling a new, not existing reality) assumes movement of consciousness through all levels making integrity of the architectural form. Virtual modeling allows at least partially fixing work results at separate levels. For example, it is possible to imagine a model of functional zoning of an architectural construction, conditional model of its volumetric solution, model of spatial communications, up to the semantic models describing an object at the conceptual level.

Representation of the mechanism of the communications uniting all levels can be submitted by the procedure of displacement of accents between them. Experience of movement through levels is characterized by the same cyclic pattern: creation of set of decisions and a choice of the one, the most adequate to the chosen architectural theme.

Moving the chosen model to a context of another level allows creating another combinatory set, having used other parameters of a problem.

For example, one of the set of the volumetric models received on a combinatory field of a morphological level serves as a prototype of an inhabited home.

Transferred in a combinatory field of spatial communications the model derivates a new set.
The criteria lying in the following level, in this case, in a level of functional filling, help to make a choice of the individual, final decision.

Change of combinatory fields can precede indefinitely filling the digital model with more and more new architectural parameters and qualities that approach it to a required architectural image. The quantity of attempts is accounted for by a task in view.

The choice of levels being researched and a route of movement along them can also vary. However it is obvious that the described chain of sliding through the combinatory fields built in other sequence brings new results. Other sides of the mechanism of interaction between separate levels are revealed.

We can take as another prototype of an apartment house the scheme of functional zoning. Incorporated with circuits of spatial communications and immersed in a combinatory field of a morphological level, it derivates set of volumetric decisions.