

# Optimal Choice of the Equipment Depending on the Requirements of Educational Projecting

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## Abstract

The means of architectural endoscopy play an important role in teaching architects, making it possible to form effectively spatial perception. However, the high price of the up-to-date equipment requires its optimal implementation. On the early stages of training architectural students it is reasonable to use sufficiently simple devices: telemakoscope connected with a 386DX-computer and printer to get static video series. More complicated educational projects demand studying the object in movement, so a VHS or S-VHS VCR is added to the system. And finally a complex system, comprising minimum 486DX-computer, videostudio and special modernized camcorder is intended for real architectural projects. Such systems make it possible to combine the projected object with the real environment, executing the object itself either in the form of a computer 3D-model or in the form of scale model. The examples of training and real works, illustrate the efficiency of employing proposed system in various fields of architectural designing.

## Introduction

During the two last years many great changes have taken place in the work of our laboratory. While earlier we offered architects only endoscopic methods for the use in educational and real projects and envisaged only work with small-size mock-ups (as a rule ranging from 1:50 to 1:5000), now we speak about a single video-computer space, which enables the architect, both perspective and performing real designs, to imagine the designed object in the real situation. We consider "endoscopy" as possibility to analyse the object from the inside, not depending on tools used by us - not only examining mock-ups by periscope devices but also placing images of mock-ups and 3D computer models in the real video-environment. Depending on project technologies, used by the architect, and the specific character of the problems to be designed, we offer video-computer complexes differing in the cost and complexity. In the same way as earlier, depending on the real possibilities of the Institute, we try to choose equipment of minimum cost allowing to get adequate results taking into account the free of charge education. We take into account also traditions of mock-up methods of designing, established in the Institute in the 20's as well as recommendations of a number of foreign architects and architectural organizations - to retain in the future the individuality

and specific character of methods of architectural education adopted here. The ideas described in this paper are not opposed to the CAAD, we only want to declare, that at the present time and especially in Russia economical conditions for mass employment of computers on all levels of education are absent, but the use by practically all students of technical aids of video-computer modelling based on mock-up designing is quite real. Due to the mock-up the creative conception of the architect gets a visual material expression. The mock-up method develops the ability to visually perceive and evaluate the solution making the conception clear. The architect must be able to see the object being designed and from this point of view a small-scale mock-up is likely to be more preferable, as the computer-made image is seen from an already chosen point and does not allow to check whether the perception of the small-scale model is correct. The mock-up method gets different characters depending on the problem. The preparation of mock-ups for individual objects - three-dimensional and spatial mock-ups of projects of schools, cinemas - helps the search for the external architectural image of the object and develops the three-dimensional image of the structure. Especially important are mock-ups of interiors, which help to understand the interrelation of the exterior and the interior. The town-planning mock-up displays the spatial conception of the development, its connection with environment. The preparation of mock-ups of the object in a particular natural or town-planning environment shows the connection of architecture and landscape, representing an individual building as a part of a more complicated system. However, it is known, that the employment of mock-up methods of designing requires using special periscope devices ensuring real perception. Our many-years-long experience of work made us come to the conclusion that the effectiveness of this technology can be considerably heightened, if the above-mentioned devices begin to play the role of original information transmitters connected with computers. Depending on the specific character and complexity of the problems to be designed it is possible to provide inexpensive video-computer complexes ensuring optimum employment of the equipment. The computers used in the complexes can be used in the spare time for the solution of various problems.

### **Complex 1**

At first students performed their tasks using the available devices. However, as a result of the accumulated experience some changes were made in it. Though it still contains a photcamera, it is not used as a rule. The present-day appearance of the complex is shown in figure 1. The video camera of the telemakoscope is connected by means of a AVer 2000 PRO card with a computer 386DX. As mock-ups made by students are monochrome as a rule only cheap white-and-black technique is used. The complex makes it possible

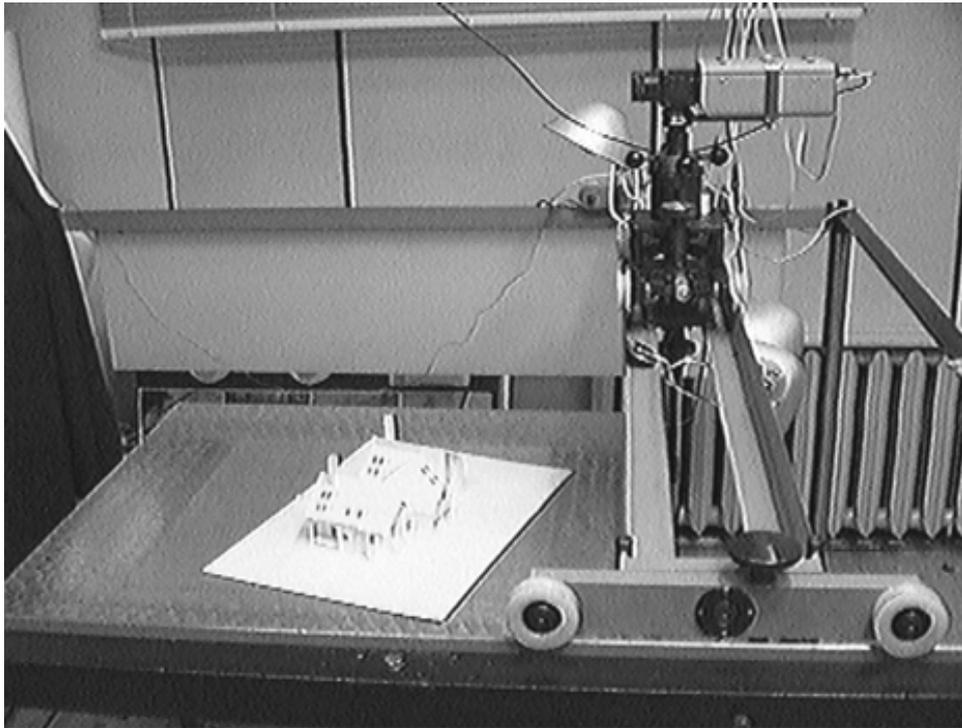


Fig. 1 Telemaketscope.

to analyse mock-ups from real points and get printer copies of the chosen frames (frame grabbing). It is possible to use later stored files of images and to process the frames depending on the available software. If it is necessary to get and record dynamic video rows, a video recorder is connected to the video camera beside a computer and the images seen at the chosen trajectories of movement are recorded. The complex is to serve students beginning from the second year of studies up to the diploma design. During the work of junior students at the complex the possibility to change the stature of the observer makes it possible to understand the scale of the composition. A positive role during the training is played also by the possibility of simultaneous watching a three-dimensional mock-up and its image on the monitor's screen. For example the following experiment took place. The students were told to make some drawings of mock-ups from the point of view of a man corresponding to the mock-up scale. Then the drawings were compared with the images of the monitor's screen corresponding to the same points on the telemaketscope. The work at the images turned out to be very difficult and the results were unexpected by students, displaying the undeveloped spatial ideas of junior students. The possibility of flexible work with light sources gives one more methodological advantage - the student learns to show forms by the light watching results from real points. During the training the employment of the complex for studying the object in movement and the possibility of getting a successive row of images is of importance. Some examples of its employment are shown in figure 2.

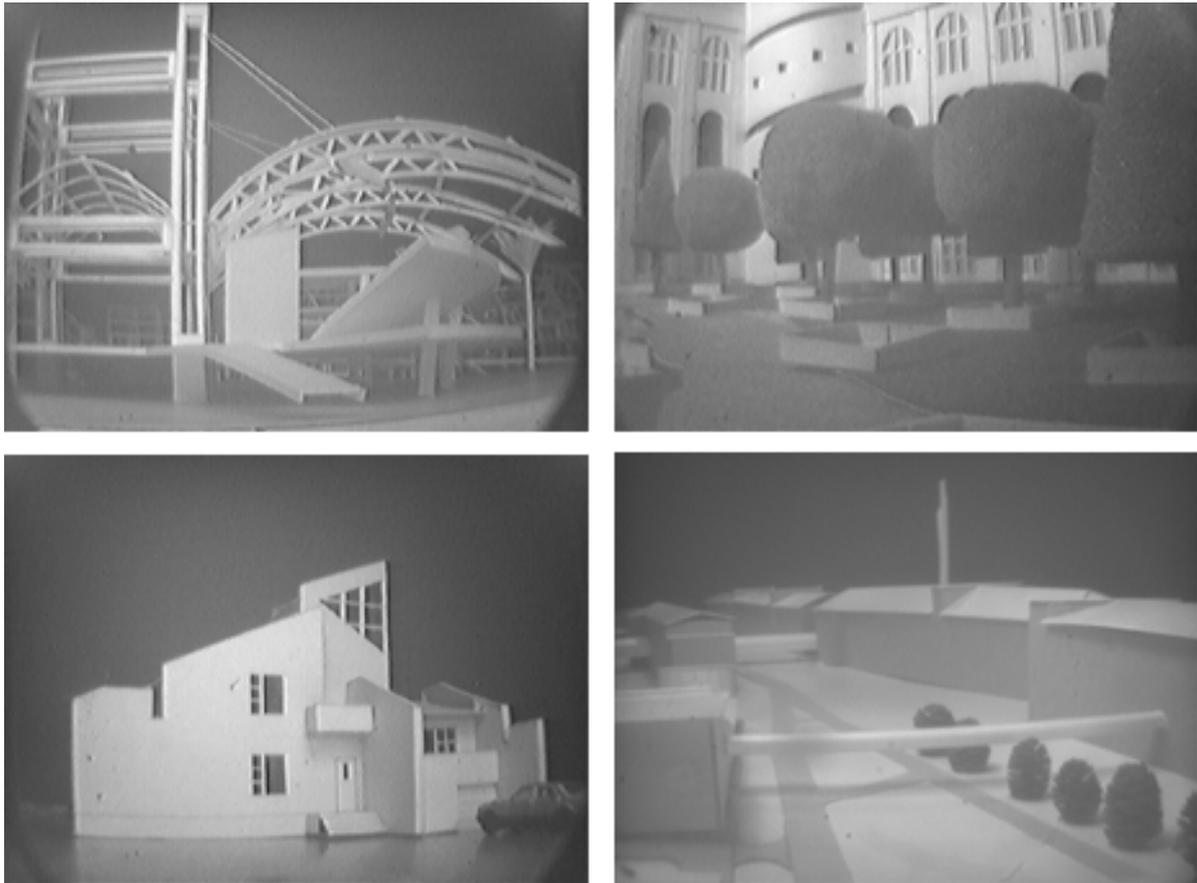


Fig. 2 Some examples of Moscow endoscopy work.

### **Complex 2**

The possibility of operative work and analyses of coloured mock-ups resulted in the appearance of a complex on the base of a portable camcorder with a medical endoscope and an additional optical adapter. The camcorder is placed on a special tripod with a cantilever and can be connected with one of our computers with a video adapter. The small diameter of the endoscope provides for easy work on mock-ups especially when analysing interiors. As coloured mock-ups are executed, as a rule, by senior students or for commissioned works, it defines also chief users. This complex enables us to get both static video rows with colour printer or video printer copies and video fragments recorded on a video tape in VHS format. The general appearance of the device (without a computer) and fragments of some works executed by it are shown in figure 3.

### **Complex 3**

A special place in the laboratory is taken by a complex based on a S-VHS mini video studio with a 486DX2 computer (with video adapters). Its employment makes it possible to solve problems of another level - analysing

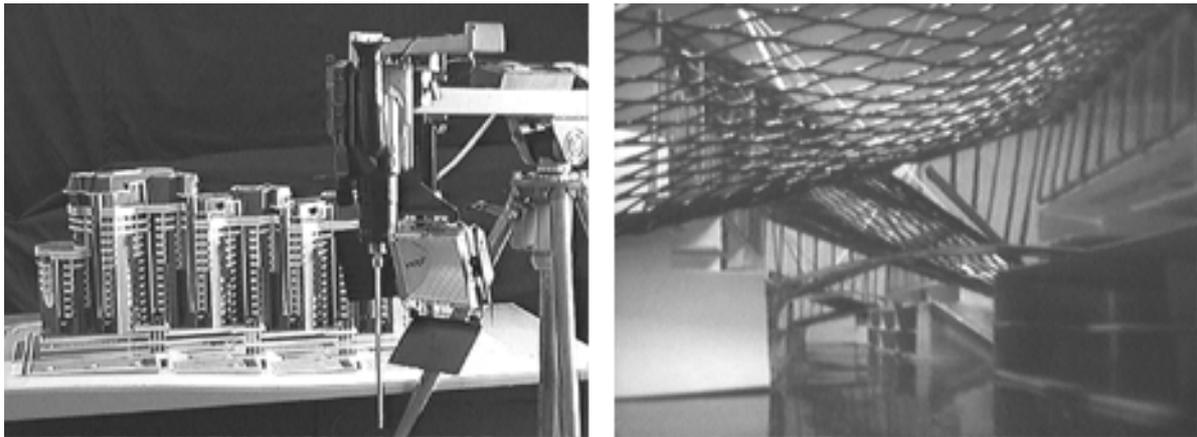


Fig. 3 Complex 1 with example.

designed objects in a real environment. Besides the above-mentioned computer complex contains 2 S-VHS camcorders, 2 S-VHS video recorders, editing controller, digital mixer and monitors. The computer is provided with a Video Commander 2 card resp., an overlay card for the output of computer images with superposition on the exterior video signal. The employment of such equipment makes it possible not only to model the object to be designed executed as a mock-up or three-dimensional computer image in a real environment, but also to create small video materials with the necessary additional information on the design. Three such works were carried out in the laboratory during the last two years. One of them is devoted to the design of an office building in the historic centre of Moscow and was necessary for getting the permission for the construction.



Fig. 4 Reconstruction of Great Gostiny Dvor.

Another is connected with the reconstruction of a historic building - Great Gostiny Dvor near the Kremlin and allows to analyse a variant of a students' design of a park and an underground cultural complex in the inner yard (Fig. 4). Here complex 1 was also used. The last work is connected with the reconstruction of one of the central streets of the city of Astrakhan on the Volga.

When working at the project we carried out historical analyses using archive text and photo materials, which was reflected in the video fragment. Project proposals for the reconstruction of the façades of one of the retained buildings, reviving the lost aspect of one of the street sites - all this is shown in real video with the use of mock-ups 1:200. Some frames from the video fragments are shown in Fig. 5.



Fig. 5 Employment of complex 3 in real designing.

The insufficient working out of details of mock-ups on this stage of the project introduces some conventions into the modelled subjects. So the employment of the described complexes enables to execute the following versions of works:

1. Looking at the object being designed from real observation points and if necessary with regard to the real situation in the process of searching for the design solution (it is possible to use photos, video recording and the object itself is executed in the form of a mock-up). This problem is usually solved by video methods (including endoscopy) but for some additional work and documentation we use computers.
2. When depicting the resulting information (final design solution) we carry out searching for the necessary observation points and trajectories of movement, work out a scenario of presenting the design solution and make - besides printer copies - also a video fragment containing a picture of the initial situation and placing there the object being designed. The fullness and complexity of video materials depend on the problem to be solved and the importance of the designed object.

The video-computer complexes employed by us, the corresponding methods and technologies enable us spending only reasonable amounts of material means to ensure the possibility of fuller and more correct perception of designed objects for a great number of students.