



## Endoscopic Model-viewing of Students' Design Projects: An Evaluation

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### Abstract

Students at Vienna University of Technology can avail themselves (free of charge) of viewing their design projects by means of endoscope. While doing so basic knowledge on the endoscopic rendering technique is furnished, not only resulting in considerations regarding possibilities and limitations of endoscopic infrastructure, but also sounding out the conditions that prove suited already throughout the stage of model-building. Architectural-related endoscopy actually also aims at destruction-free model viewing. This contribution enumerates specific experience based on a user-inquiry regarding performed rendering situations throughout the last three years. Two diploma theses are dealt with in more detail in this context, i.e.: the re-design of the Railway Station Vienna-Praterstern and the new building of the Archeological Museum at Nicosia.

### Introduction

The equipment of the Endoscopy Facility at Vienna University of Technology was illustrated on the occasion of the first eaea-conference at TKK Tampere in 1993 [1]. Ever since completion of the so-called "Full-scale Laboratory" in 1992 students can use endoscopy for viewing and taking pictures of their models generated in the framework of (design-) workshops and diploma theses activities (subject to staff-resources). A Photography-Instruction Position established has so far been able to provide sufficient personal support. The studio situation – consisting of an exposure table, background wall, window- and spotlight – has hardly changed since the beginning, a further endoscope and a 3CCD-camera of Storz Company, however, were added. Apart from the possibility to create a video-signal mainly endo-photography is being performed. A tendency towards digitizing of analogous source material is registered on the whole, as the quality of the scanned-in stills is significantly

better than that of the video-frames obtained.

Upon student's initiative an endo-appointment can be scheduled. The present contribution aims at finding out which possibilities and limitations the community of users has experienced by evaluating the range of services offered throughout "Endoscopic Rendering" based on a comprehensive questionnaire filled in at the end of a model-rendering session by the participants.

### **Performance and Assessment of Questionnaire**

The questionnaire developed for this evaluation consisted of questions to be ticked as well as of "open" questions and was to be completed within 15 – 20 minutes. In the period from 1998 – 2000, 8 of the total of 20 participants were involved in their diploma theses and the remaining 12 participated in the course of (design-) workshops. The activities to be assessed consisted of taking of stills by means of camera mounting:

- The first question referred to the modeling scale of the model rendered, being specified with scale 1:200 by practically half of those questioned. Multiple specifications were possible as sometimes taking of a second model is required during one session. Models in the 1:500 scale took the second rank, i.e. by a quarter of respondents. One to two other specifications regarding the remaining intermediary stages of total scale between 1:1000 to 1:20. were also issued. Keeping the viewing position at human eye level (approx. 1.60 m) proves difficult regarding the 1:1000 model. Concerning models in the 1:20 scale the implementation of a shift lens system seems meaningful as the compact make of endoscope hardly is to be regarded of any specific use.
- Eighteen participants stated that their design work was completed at the time of picture taking. No wonder that the same number made no changes in design based on the endoscopic pictures, thus utilizing the pictures more for illustration than for exploration. Approx. the half of the respondents stated that the design had also been modeled (simultaneously) by means of computer-

assistance. The question, as to what extent the process of communication with the persons assisting had influenced the designs issued by means of endoscopic pictures, was specified by approx. half of the participants in terms of both making things easier and improvement. Three students even registered a saving of time as the design ideas were to be singled out more clearly and thoroughly.

- Three-quarters of the users stated to want to use endoscopic rendering techniques in future design work again. Regarding a comprehensive assessment of usefulness the ability of viewing the model from a “human” perspective was regarded as “favorable”. Granting realistic insights thus is positive, the experiencing of which (“to be standing inside”) is particularly striking. Space impressions furnished can be documented by means of attractive presentation pictures, to be subjected to computer-assisted touch-up so required. Professional rendering quality is another asset noticed. A shortcoming registered was that the heat emitted by the halogen headlamps might damage to the model. One participant considered positioning the endoscope as camera attachment as awkward.

- Technical support during the rendering sessions was also subjected to rating, the classification “unsatisfactory” not being mentioned at all. Ten respondents ticked the rating “satisfactory” and six participants chose the category “other” adding “excellent”. Offering help as well as competent counseling and information regarding suited exposure positions were mentioned in particular. The continuous presence of a professional was also regarded as invaluable as well as readiness to comply with own wishes and ideas.

- Various ideas regarding additions, changes and adjustments for the service range offered in “Endoscopic Rendering” were furnished, e.g. increasing implementation at the early design stage, in order to be estimate spatial dimensions and impression more precisely. Moreover, several requests as to improvement of resolution of endoscopes were made, in order to do away with fuzziness of pictures. Repeatedly participants suggested to invest in effective advertising on the subject, not to be dealt as a mere “insider tip”.



Such a campaign could even be accompanied by a brief introduction workshop.

Normally an endo-session starts with a student's independent investigation of the model testing different endoscope-positions. The endoscope as such doubtlessly encourages this kind of approach. In the course of time more support will be required as endo-photography calls for careful light- and camera adjustments. The question arises, however, whether the most advanced technical quality has to be implemented in every case, as utilization might and should differ somewhat in conditions other than in the lab situation described in this contribution. A mobile endoscopy-station in a meeting room could lend itself to quick and easy investigating a (simple) working model ("quick and dirty").

Nowadays practically every student disposes of his very own efficient computer equipment and is well able to utilize it efficiently. University centers also offer computer facilities. Endoscopic equipment, however, is not as widely available for students and training possibilities cannot be taken for granted. If the costs for endoscopy

Fig 1: Project Hypertrans: endoscopic model pictures



equipment dropped to approx. 400-500 Euros, students surely would be encouraged to buy an endoscope of their own in the course of their studies. considering the fact that it would not have to be replaced every 2 to 3 years. Fitting rings and adaptors for common miniature camera bodies are available, but “classical endo-photography” calls for specialized knowledge. Linking to a (possibly available) Camcorder etc. surely would prove interesting. Normally non-removable lenses are used, however. This would amount to the fact that tested temporary solutions for differing filter threads, etc. would have to be available. The camcorder-endoscopist would be able to see the result immediately which - so required - could be immediately subjected to computer-assisted processing. The inhibiting step of developing of film could be dropped! What is to be considered in this context is that this would only lend itself to the making of stills and “mini-drives”.

### **Exemplary Presentation of Two Diploma Theses**

Two diploma theses integrating endoscopic rendering included in the questionnaire are to be illustrated in more detail as follows with a brief description of the specific topic chosen.



Fig 2: Project Hypertrans:  
model to be viewed



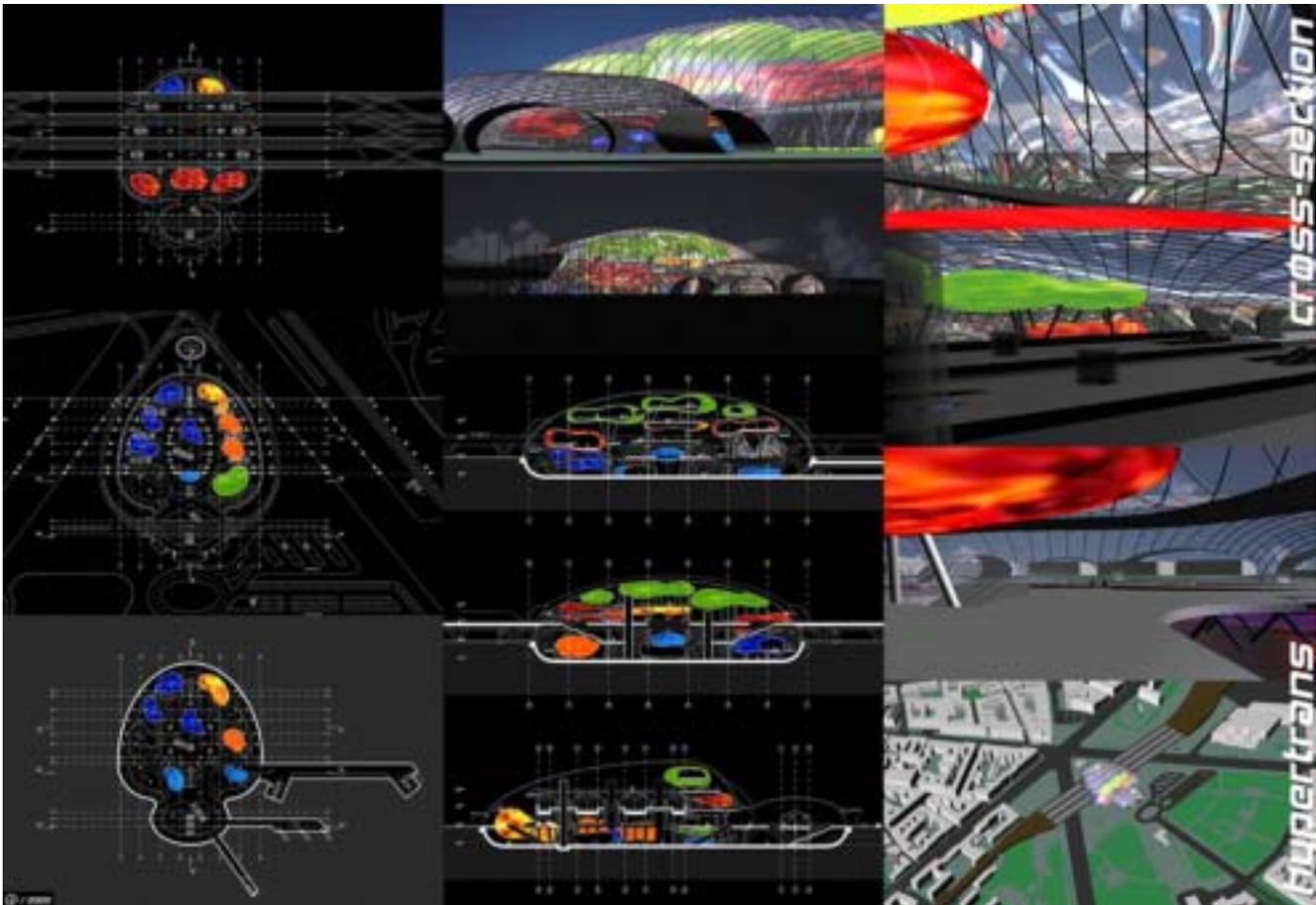
Fig 3: Project Hypertrans: endoscopic  
model pictures



## Leonhard Coreth: “Hypertrans – Traffic Junction of the Future”

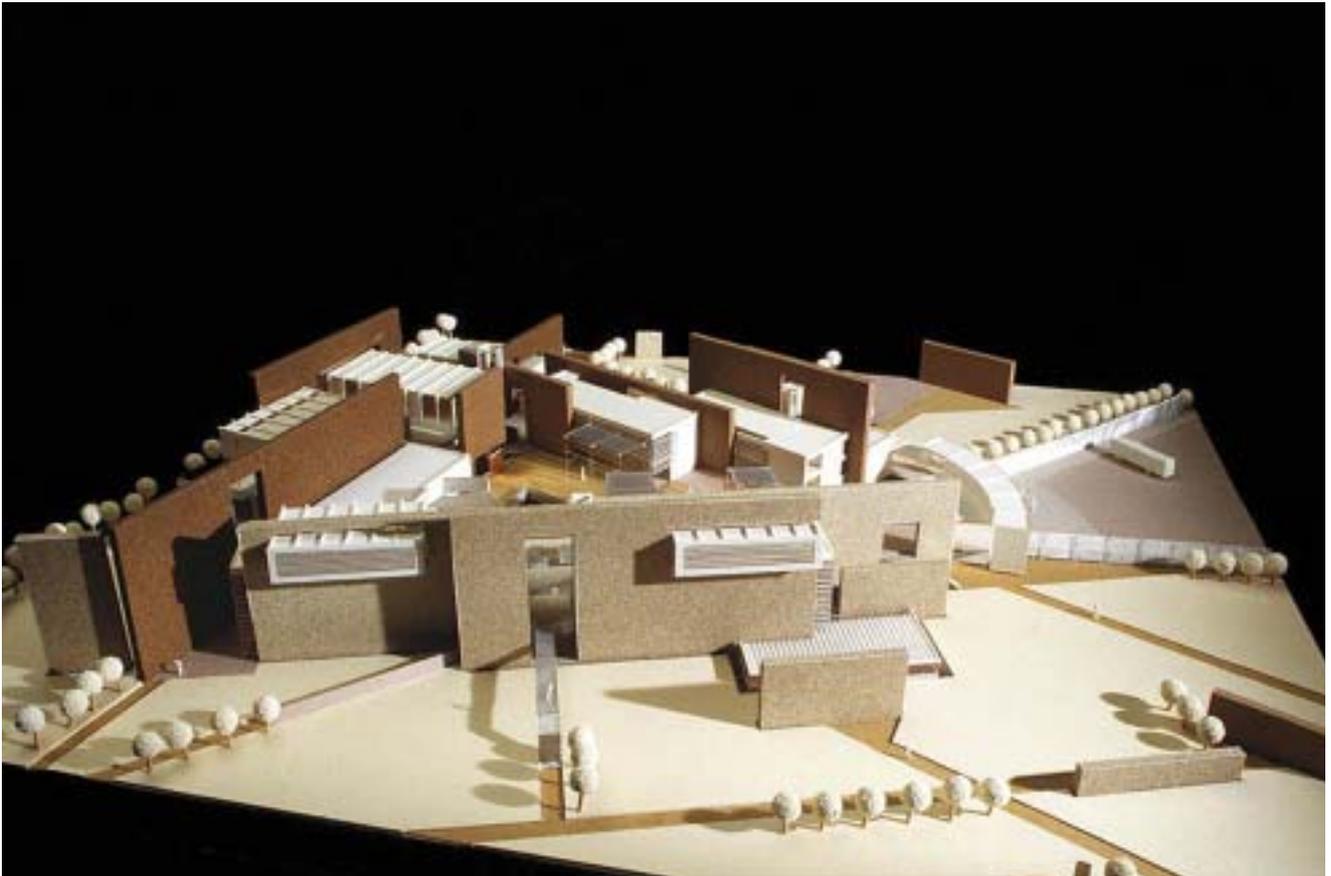
At the beginning of the 21st century public traffic and its buildings are facing new challenges. In the framework of this diploma thesis design work for re-designing the Railway Station Vienna-Praterstern was issued. The term “Hypertrans” implies a multi-functional traffic junction enabling also virtual journeys taking into account the interactive requirements of present-day society. Apart from both convenient transfer- and shopping facilities and entertainment-orientated eating delights the passenger is also invited to relax. The constructional exterior is an organ defined by movement amounting

Fig 4: Project Hypertrans:  
computer-assisted representation



to a heart pulsating life, absorbing passengers through its “veins” and discharging them (enriched) at a different place. In the interior of the cover information units float as defined organs in space and are surrounded by transparent open space (ambient space). Interspaces, elevators, levels and ramps compact the multi-level traffic structure to a network with numerous interfaces and are covered-in by a space cover. During the day the transparent cover serving as projection area opens the view to the outside, at night it becomes a radiant eye-catcher, on the surface of which the virtual space blends into the real space by overlaying of various rushes.

Fig 5-14: Project Nicosia  
model to be viewed and endoscopic  
model pictures



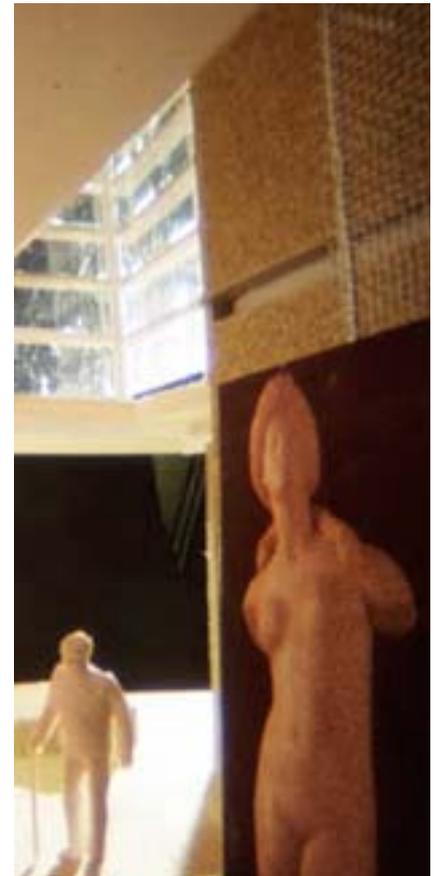
Endoscopic pictures were taken in the final stage of work as addition to computer-assisted representations. Using metaphors (organs, beating heart, etc.) reminds us of the original medical context of endoscopic use. The endoscopic pictures thus convey the model reality.

**Andry Michael und Ewald Schubarth: “New Building of the Archeological Museum Nicosia (Cyprus)”**

The planning site is situated in the western part of Nicosia City, near the occupied zone. The adjacent park area adds to the attractiveness



of the planned museum terrain. The structure of the site with its building complex first gives a fragmented impression associated with (abstracted) archeological excavation sites: No boundaries to the street were to be formed or to be defined by means of blocks of buildings at the edge. The discs “scattered” throughout the site are brought to perfection in the building complex. The boundaries between interior and exterior space thus are subjected to a new definition. The wall discs and the resulting buildings are positioned to make for an impressing connection to the city structure by means of a network of correlated axes. Geometrification plays a major role regarding developing of the site. Exhibited objects are placed in front



of a disk acting as suited background. Slots and openings allow for intensifying of viewing relations.

Throughout all stages of design process physical model generation studies were performed also including viewing thereof. Endoscopic picture series allowed for checking in the more advanced design stage and proved themselves as meaningful means in approaching spatial experience.



## Conclusions

This contribution deals with the findings resulting from a user-inquiry concerning implementation of endoscopic rendering techniques in the framework of students' design work. These implementations were aimed exclusively at producing stills and non-animated pictures, as specific limitations due to the equipment at the Vienna University of Technology do not allow for this (Cambo/studio tripod). The users were fully aware of the possibilities and limitations connected with endoscopic model rendering. False modesty, however, is out of place and a promotion campaign could prove very meaningful, even if the pictures obtained not always can be described as "sexy". Developments within the eaea clearly show that we are not facing a brutal match "endoscope vs. computer". The field of visual environment simulation has considerably increased due to the vast availability of hard/ and software. This, however, does not apply to the availability of equipment for endoscopic purposes still being produced in mini-series.

In the course of continual miniaturizing of photographic appliances it is very likely that the "endoscope" as an instrument in the form we know today (Niro-body with integrated optical elements) is practically obsolete. Due to its compact construction and the resulting utilization of miniaturized optical elements the picture quality as well as the aperture of lens and the definition of image might prove problematic. Developments concerning the peripheral field are enormous and the miniaturized CCD-camera might be able to replace the traditional endoscope.

The strong points of digital simulation products doubtlessly result from not having to be stationary at one specific site and thus the (simultaneous) availability at several sites. Further digitization of endoscopy thus is to be regarded a challenge, the term as such referring etymologically to "inner-view". Perception as such thus is of major importance in this context.

## **Acknowledgements**

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## **Reference**

[1] Martens, Bob (1993), A Renaissance of Architectural Endoscopy, in: Proceedings 1st eaea-Conference, pp. 143-151, Tampere, TKK Tampere, 1993.