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RECONSTRUCTION OF THE ANCIENT TOWN OF EMDER BY THE MEANS OF A COMPUTER MODEL

Usage of computer technology - the modern and adequate tool for visualisation of partially lost historical objects and reconstruction of ancient monuments. Digital methods can be applied multimedia presentations, including animated video of architectural monuments. So there is a need of different approaches, which is especially important for the study and restoring of cultural monuments.

Keywords: reconstruction, a computer model, town of Emder

One of the goals of the given article is to attract attention of computer graphics and information technologies experts to the virtual resources creation of cultural heritage which will be accessible in the sphere of education by the means of the Internet network.

Usage of computer technology - the modern and adequate tool for visualisation of partially lost historical objects and reconstruction of ancient monuments. Digital methods can be applied by multimedia presentations, including animated video of architectural monuments. Therefore, there is a need of different approaches, which is especially important for the study and restoring of cultural monuments.

The reconstructed virtual three-dimensional models give an opportunity to see not only architectural constructions, but household items of historical and cultural heritage as well, that were reconstructed on archeological excavations fragments. Thus, it is possible to popularize and study objects, which are limited in access in order to avoid their damage or destruction.

Once upon a time there was a beautiful town of Emder on the banks of the river

Emder. The ancient town of Emder is a historical monument of federal value of the dying out nation Khanty and Mansi. The history and culture of the Khanty-Mansiysk Autonomous Okrug is closely connected with history and culture of Obskie Ugry, who are two closely related peoples – Khanty and Mansi. The Khanty's traditional occupations were fishery, taiga hunting and reindeer herding. The Khanty and the Mansi live in the Khanty-Mansiysk Autonomous Okrug that is a part of

the Tyumen Region in the north-western Siberia. The overwhelming pressure of industry and alien ways of life have cast doubt on the further existence of the Khanty and the Mansi peoples as a nation.

Archeologists have found the town of Emder due to the ancient fairy tale "Bylinas about the Bogatyrs from the Town of Emder" (a bylina – a Russian traditional folk heroic poem; a bogatyr – a strong warrior in Russian folklore). According to archeologists excavations there was an ancient town of Emder on the river Endyr in which brothers from a princedome lived in the late Middle Ages. He was located on the 35-metre coastal terrace and amazed by the impressive rests of fortification system. The coulor of the dug soil showed that the place was settled down by people long time ago. One could see it in the rests of fortress fortifications which were many time reconstructed: in some places the early (partially strew up) and late ditches, the rests of fortification walls in the form of rampart could be seen. On the cape where the fortified town is located a huge larch – several holds around –is growing. Immediately the lines of the bylina about night talk of Yaga, in the shape of the eagle sitting on the wind-broken shaggy larch, with a young girl comes to the mind!

The archaeological material shows that in small town of Emder there were forge, bronze-casting, bones-cutting, tanning crafts and weaving. The numerous observations made at excavations allow characterizing of fortress inhabitants as skilled masters, soldiers and craftsmen.

Time of small town of Emder existence: from the end of the XI–XII centuries – the second half of the XV–XVI centuries. Throughout almost 500 years the fortress existed continuously.

Building technologies used to create the town-fortress, in particular, larch, were a major factor of the architectural shaping. Old Emder fortress is an example of unique architecture, partially hidden under ground.

We have to create a plausible reconstruction of the ancient town of Emder by the means of the 3D Studio MAX program. This reconstruction of the ancient town of Emder is largely based on three types of sources: a full picture of the object on the basis of archival data, maps and field studies of archeologists that will represent architectural peculiarities in three-dimensional space with mathematical accuracy.

The 3D Studio MAX program was chosen as the medium because of its potential to create full colour images of the ancient town of Emder in perspective with textures and shadows, inscribed in the terrain. Such models exhaustively describe the geometry of the historic and architectural monument.

We have define 6 stages of three-dimensional model creation of the fortified town of Emder:

1. Gathering and processing of the information necessary for creation of initial drawings and 3D - objects modeling.

2. Creation of 2D-graphics of separate elements of small town, scheme of structures arrangement, ditches and fortress towers in the AutoCAD program (Fig. 1).

3. Construction of three-dimensional model of the object and adjoining territories by the means of three-dimensional graphics.

4. Selection of materials and texturing of simulated 3D – objects.

5. Illumination and visualisation of 3D - objects and landscape (Fig. 2).

6. The digital rendering of separate images and animation video series.

At the initial stage of reconstruction of the town of Emder we had collected as much as possible information and analysed it using different kinds of information databases: considerable quantity of the text and cartographical information, the description of archeological excavations, photos, scientific historical researches, museum exhibits and even oral folklore. There are about 30 ethnographic and local lore museums in our Okrug. To our opinion out-door museums are one of the interesting forms of the museum business. The necessary material can be obtained from web pages of ethnography museums as well.

At the following preparatory stage, connected with designing of 3D-model of the town of Emder, 2D-drawings on the basis of the given archeological excavations were created in the AutoCAD program. The AutoCAD Program has been chosen not occasionally, since it allows importing of drawings to the 3D Studio MAX three-dimensional modeling add-on. At the given stage the main goal was to define and preserve proportions of objects in the fortress-town and follow its basic style features of constructions. On the basis of the program drawings of Emdera town map, taking into account all features of its difficult lay-out (ditches, rampart, banks, vales, buildings etc.), are created. The first necessary thing is to analyse research job, and to define the area of studied object. Thus the foreground of our project is the plan of the town territory in the form of the radiuses shown as a contour line. The main complexity of the work was impossibility to define precisely the height of constructions from the documents we had in our disposal. The height was defined under the anthropological description of the Khanty people which are 1,5 m high in average. Presence in the town of horses' remains and harnesses has indicated that the entrance into the main tower should correspond to the horseman height.

Structures, landscape, objects, trees, firmament, sources of illumination and animation create a real atmosphere around the recreated historical object and give possibility of its viewing from different positions. The objects of heritage presented in the 3d-graphics, allow almost touch an exhibit, and for few seconds to "be transferred" from one century to another. The 3D-reconstruction and animation replace stage of physical prototyping of an object and virtually represent a simulated object with composite-visual and landscape analysis of a territory.

At the stage of computer visualisation of the constructed three-dimensional model with structures and illumination the time of the image calculation is respectively increasing; considerable resources of computer operative memory and software are required. The higher the quality requirements to the virtual animation image and volume, the more time is required for the final stage of a virtual reconstruction and top efficiency of modern information technologies possibilities usage.

Further on such model can be interactive: the observer will carry out navigation in virtual space, examining once existed ancient town of Emder.

Computer 3D-modelling and animation of virtual reality promotes cultural heritage popularisation, and brings together archeology with education and entertainment businesses. The considered method is a modern source of scientific research and creation of three-dimensional models base of historical and cultural heritage objects of the Khanty and Mansy peoples in the West Siberia.

Thus, the virtual reconstruction of architectural monuments should be based on optimum combination of new information technologies possibilities, creative and art thinking and understanding. Traditional graphic methods without use of computer do not provide the same results. The results of the study could be used to develop practical recommendations for the conservation and reconstruction of the most interesting historical and architectural monuments.

Fig. 1 Input in internal fortress. Internal defensive wall.

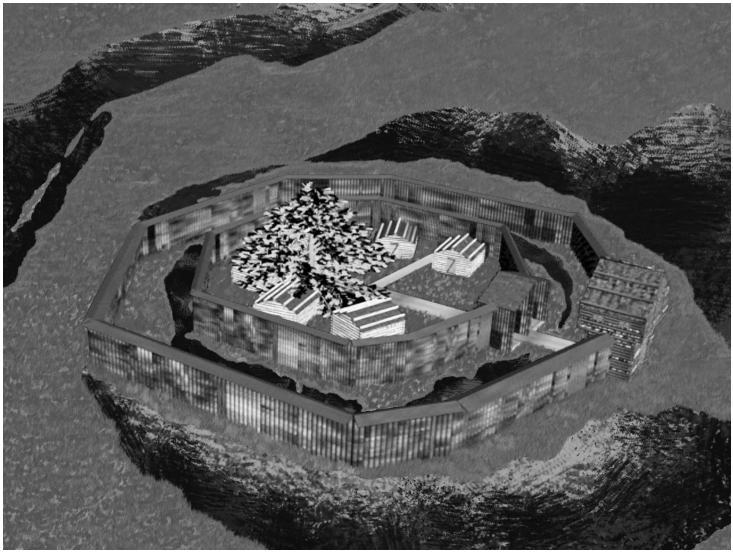

Fig. 2 3D - objects and landscape.