UDC 624.04:004.28(045)

Victoria Gyrych
Oleksandr Tereshchenko

LOCALIZATION OF THE ARCHITECTURAL-BUILDING PACKAGE REVIT IN UKRAINE, CREATION OF LIBRARIES

NAU Institute of the Municipal Activity
E-mail: vitalina@mail.ru

The process of designing in the architectural-building package Revit is considered and the advantages of work exactly in it are shown. Principle of parametric modeling is presented, which allows to represent all aspects of building constructions in a model. Libraries' elements were developed and parameterized, which correspond to the Ukrainian standards and norms.

Розглянуто процес проектування в архітектурно-будівельному пакеті Revit і показано переваги роботи саме в ньому. Подано принцип параметричного моделювання, що дозволяє відобразити в моделі всі аспекти конструкції будівлі. Розроблено запараметризовані бібліотеки елементів, які відповідають Українським стандартам і нормам.

Introduction

As it is generally known, the greater part of designing cycle is occupied by the stage of the working designing.
But from the other hand, decisions, which determine a benefit, durability and beauty of building, are mortgaged on the earlier conceptual stage.
While automatizing designing, it is fully logically to do these two stages as a single, nonconflicting and interdependent process.
Unfortunately, the new decisions offered until now for the conceptual and detailed design were made by quite different computer programs. That's why there was done the work, during which the given problem was solved.

Research analysis

In a process of designing the great number of the programs were used, but however the choice was stopped on the architectural-building software of Autodesk – Revit, which has appeared at the market of Ukraine recently. In the Western countries it has already been used with a great success for a long time.
Nowadays documentation on Russian language for this program is fully absent.
The works of users in accordance with our standards don't exist. However efficiency of designing is considerably increased due to the valuable use of the Revit Building possibilities as a result of its deep study.
The program allows us to create the dynamic informative model of building with possibility to bring changes from all represented views (fig. 1), and also by means of data adjustment directly in the created tables and specifications.

Any actions upon the elements of building model are instantly represented in the whole project without destroying established intercommunications.
For example, during moving of partition in the plan, the modification of related elements and dimension lines, re-calculation of apartments areas, update of tables are carried out automatically.
All views are changed dynamically, including configured sheets. We should only control the result of displacement and print.
A similar action of users, for example in AutoCAD, would result in the complete rechecking and manual adjustment of all reflections, tables and documentation related with edited element.
The use of the Autodesk Revit software is substantial economy of time and all this is within the single file, project.
The conclusion about the practical application of Autodesk Revit Building PB №1 OOO SK «Gorstroiinvest», which was given to the joint-stock company «Arcada» by the agreement about collaboration from May 27, 2005 serves as the approvement of the given analysis.

Fig. 1. Bringing of changes in the 3D view

Problem stating

The parametric modeling allows us to reflect in a model all aspects of building from engineering to aesthetic (fig. 2).

Fig. 2. Engineering and aesthetic elements

The creation of elements' libraries, which would correspond to the Ukraine standards and norms is necessary condition for operation of this system in our terms. The feature of this process is that created elements must correspond to the structure, which Revit is based on (fig. 3).

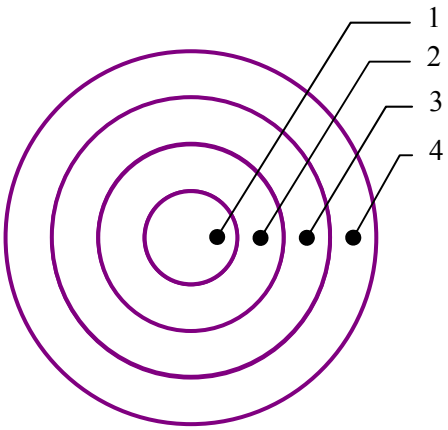

Fig. 3. Revit structure:
1 is categories;
2 is families;
3 is types;
4 is elements

Principle of parametric modeling means that Model elements must be the components of space building model (fig. 4).

All elements are divided into Host and Component ones. Host elements serve as a basis for the most Component ones. It is possible to explain this fact on the example of wall, which is a basis for the location of its component element – doors or ceiling constructions in relation to the standing on it elements of furniture. On this principle, namely correlations of one element to another, all informative model Revit and its intercommunication are built.

It is impossible to build a door outside a wall, and vice versa, while moving walls, to leave on the former place door.

It is impossible to change mark of floor level without displacing of its covering and standing on its walls and partitions. Everything must have its regularity and its observance is the substantial advantage of Revit. Such notions as Category and Subcategory are entered during the parametric modeling. Logical union of elements of different types according to their functionality is named a Category. Speaking simply, Category is the analogue of Layers in AutoCAD or ArchiCAD. But during operating with Categories there are some differences, namely presences of subcategories and automatic determination of all elements by the corresponding to them categories.

Given distribution of Component components of element on Subcategories leads to the effective management by its reflection in views and gives us opportunity to design in the more exact way.

If it is necessary the list of Subcategories can be extended during the creation of Families. Categories (and some Subcategories) are system units, which are not subjected to the operations of name changing, addition, deleting of their quantity. Thus stating problem of libraries' creation is very actual today and it must be solved with intercommunication of all Revit structure corresponding at the same time to the Ukrainian standards and norms.

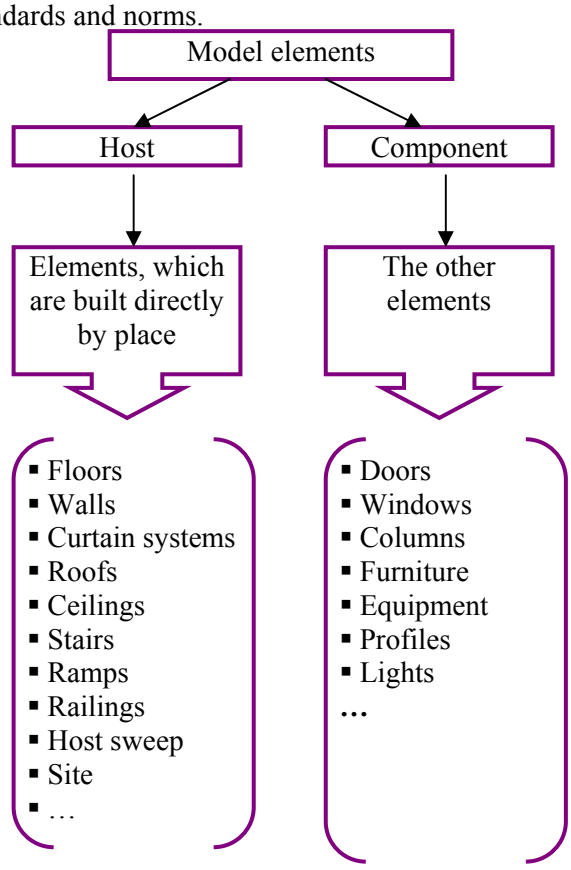

Fig. 4. Model elements

Solution of the problem

On the basis of developed parametric modeling principle, the elements' libraries of profiles, which corresponds to the Ukrainian standards and norms were created and parametrized, namely:
– equal-leg channel GOST 8240-97;
– angle-leg channel GOST 8240-97;
– unequal-leg angle GOST 8510-96;
– T-beam 14-2-685-86;
– tubes GOST 10704-91;
– I-beam GOST 8239-89 and etc.
Parametric modeling allows us to reflect in a model all aspects of building construction.
It is justified at constructing of wares, but it is surplus at designing of building, because of building constructions mainly consists of the precast components, which are bound by relatively small number of natural connections.
For the complete tying up with the program it was necessary to parameterize objects in details.
Family is the base component of project. It consists of the elements linked between themselves, which are based on a template and built-in components (Nested family).
Family in itself presents the finite element, which is guided by variations of sizes, associative communications and parameters.
The hierarchy of elements is presented as four concentric rings (fig. 3).
Borders of these rings determine correlations between the degrees of hierarchy.
We will consider this scheme on the example of Profiles.
The Category determines a hierarchy i.e. Profiles, and its variety is determined by Family.
For example, I-section, channel, angle, square pipes, steel rectangular pipes and so on.
Overall sizes, profile material are determined by Types.
A Profile is assembled in different places, on different floors and this facts are determined by properties of Elements.
From the given definition follows that Elements Parameters have a hieratic structure.
Firstly follows Instance parameters and then Types parameters.
The first one element is managed by every separately created Element, the rest ones – by all elements of definite type. Finally Categories and Subcategories are managed by the reflection of all typical elements, which correspond to their families.
In accordance with distributing of elements on Host and Component ones there are Systems family and Loads family. For example, brick wall is produced directly on a construction site that's why this is System family. Door is made on enterprises and is delivered ready for erection that's why this is Loaded families.
Autodesk Revit helps designer and architect to solve their main problem – to express beauty of architectural form through building constructions.
Moreover, all instruments of reception of working documentation, namely plans, facades, cross-sections, possibility to transmit data in such program as 3ds Max (fig. 5) become accessible on the initial designing stage.

Fig. 5. Aesthetic elements

Conclusions

The prospect of the given direction is very wide because of:
– after parameterization of all objects that are around us, designers will have a wide spectrum of the various usage of 3D space;
– in the process of planning an exact economic evaluation will be conducted, that will allow us to control the loss of facilities and decrease expenditures on building of objects.
Approaches to designing will be changed with development of new technologies, but all these changes are easily coordinated in the process of update and creation of libraries for the architectural-building package Revit.

The editors received the article on 21 February 2006.