GEOMETRIC MODELING IN AUTOCAD BASED DYNAMIC BLOCKS AND FIELDS

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Summary. The article shows the possibility of increasing the speed of work with data in AutoCAD by use dynamic blocks, attributes, and fields. It describes the ability to automation the calculations of quantity, volume and area of objects and data extraction. It describes an automatic tool of data updating when you change the values of parameters of objects or if you change the number of objects.

Key words: **AutoCAD, dynamic blocks, attributes of blocks, fields, data extraction.**

Formulation of the problem. The study in higher technical educational institutions of modern CAD systems, in particular, AutoCAD, has two global problems:

- mastering basic skills of drawings creating (construction and image editing application size, etc.);
- mastering of software automation.

In the long term future professional realization of graduates the last point is extremely important, since it determines the efficiency of engineers and designers.

Effective use of AutoCAD is impossible without the development of automated means of solving various problems that currently offers the software. However, in most cases, the study AutoCAD product in higher education teaching is limited in development by tools for creating and editing drawings. One of the simplest means of automation is the use of AutoCAD attribute blocks and fields that will be discussed in this article.

Analysis of recent researches. During the studying of AutoCAD technical universities often focus on the development of fixed assets modeling and editing established primitives [1, 2]. AutoCAD automation tools are studied little and not deep. Some researchers focus on individual work with automation tools such as dynamic blocks [4, 5] or fields [3]. But in the modern information space there is a few studies aimed at exploring the possibilities of complex use of dynamic blocks, attributes and fields. But this combination makes automation in AutoCAD the most effective, we consider it is appropriate to investigate this issue more.

The article goals. To show the possibilities of automation of processes of retrieve and update data in AutoCAD by using block attributes and fields. To show efficiency with the use of these funds.

The main part. The main purpose of the drawings creation and design documentation is the provision of comprehensive information about the object that is being designed. Some of the information is presented

graphically, and some – in the form of tables of specifications, legends, etc. There is various information, which describes the depicted objects in tabular form: quantity, area, weight, etc. To be able automate these image data must be blocks (reference blocks), and their characteristics – the attributes of the blocks. Recall the definitions of these concepts.

A block in AutoCAD is a named object that can consist of primitives, dimensions and text. As a rule, in the form of blocks images of the same objects that need to be used in the development of drawings are decorated.

Dynamic blocks are blocks that are inserted to change the shape, size and configuration with pre-defined parameters.

The block attribute is a text object that contains information about blocks, and is an integral part of the unit. The block attribute may contain different information about the objects, including one that can be used for the construction in the form of tables or calculations.

Another effective means of work automation with data in AutoCAD is the use of fields. A field is a data area in AutoCAD file, which contains certain information about the object. The field can be inserted in any place of any text: plain text field in the table, the dimension text or block attribute. Field refers directly to the object property and changes automatically when you change the corresponding parameters of the object. Applying attributes in combination with fields create a flexible tool for working with data.

Consider as an example the sequence to create an automated specification with the possibility of calculating the volume of concrete ribbed wall panels.

For example, we have a dynamic block ribbed wall panels (Fig. 1).

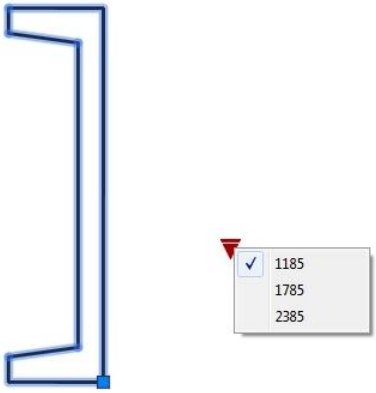

Fig. 1. Dynamic block ribbed wall panel

Description of the process of creating a dynamic block is omitted, because it goes beyond the topic of this paper.

The dynamics block allows you to select one of three types of panels with different height. Length of all sizes of panels will accept up to 3000 mm. Add to this a dynamic block, the attributes, namely: name and volume

of the design. For this open the dynamic block in the AutoCAD block editor and go to the tab "Insert".

Tool to specify attributes create two attributes for the block. First, create the attribute "Name". Convenient to the name of the object reflects some of his characteristics and to automatically change when you change the object. The value of the attribute is specified in the string "default". Write the first characters of names, which are unchanged, for example, P-, and then press the button "Add field". In the next dialog box, in field category, select "Objects" in the field name "Facility", press the button "Select object" and click the right vertical line of the contour wall panel. In the next dialog in the list of "Property", select "Length" and click OK. Thus, we tied the record in the name of the panel to the length of the segment included in the set of dynamic stretch action when the dynamic block changes its length. Therefore, the choice of a particular modification of the wall panel automatically changes its name. The entry in the string "default" would be as in fig. 2.

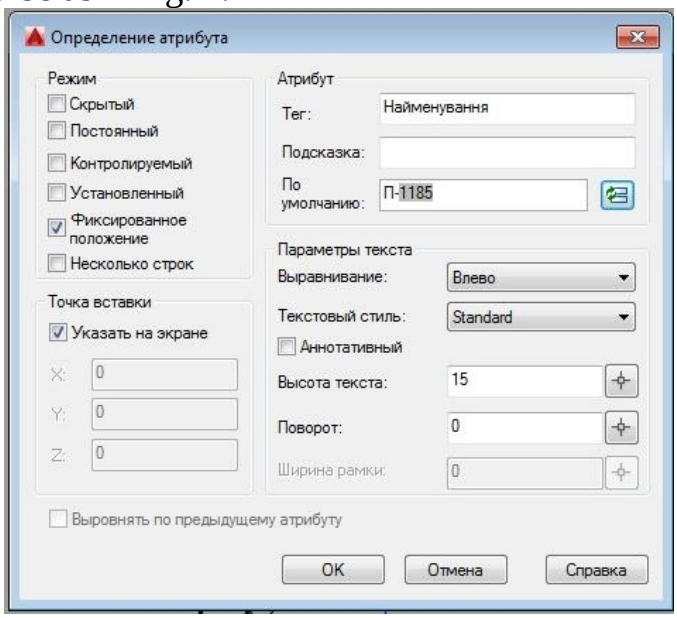

Fig. 2. The job part of the record of the attribute name of the bar across the field

Similarly, create an attribute "Volume". The value will also set through the field, with field names choose a formula which will bind the cross-sectional area and length. The cross-sectional area of the panel will ask directly putting a polyline that forms the contour of the panel. Verify proper operation of the unit. Close the block editor, saving these changes.

Insert the block a few times and it will copy. Using dynamic properties will receive all sizes of wall panels (Fig. 3). It is obvious that attribute values do not correspond to the characteristics of the depicted panels. To update attributes you want to allocate the blocks and run the command "Update field", then all values are displayed correctly (Fig. 4).

Change the number of occurrences of blocks of the wall panels and create their specification by executing the command "Extract data". When determining the type of objects to extract from them data it is advisable only to select blocks with attributes. The table of specifications may look as in fig. 5.

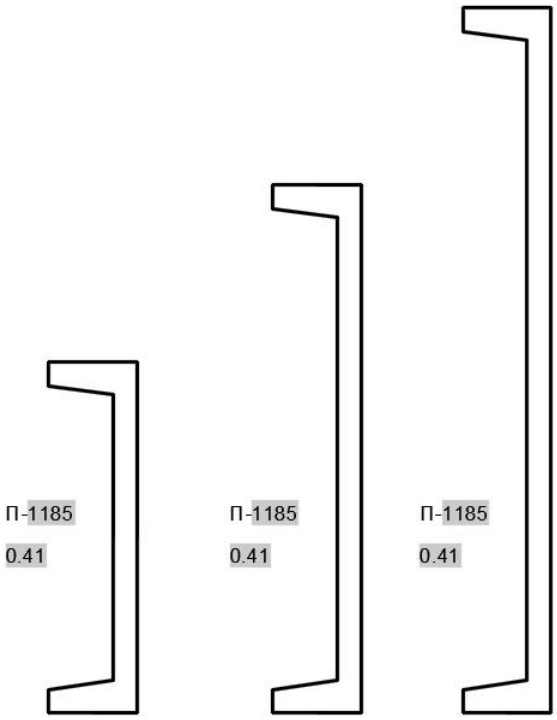

Fig. 3. Dynamic blocks three sizes of wall panels

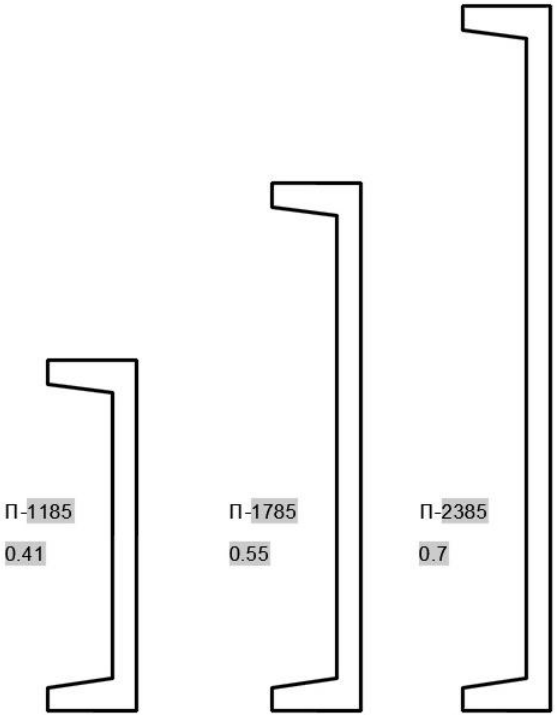

Fig. 4. Display block attributes after performing the update operation fields

To update data in a table by reducing the number of occurrences of blocks you need to allocate its cell and from the context menu select "Extract data – Update data extraction".

Специфікація стінових панелей			
НАЙМЕНУВАННЯ	Кількість	ОБ'ЄМ	Загальний обєм
П-2385	2	0.7	1.4000
П-1785	3	0.55	1.6500
П-1185	4	0.41	1.6400
			4.6900

Fig. 5. The specification of wall panels

When the number of block references increases, choose again "Extract data", choose the option "Edit an existing data extraction to create a new table.

In the BOM table you can add a column with a formula called "Mass", where multiplying a constant coefficient – the density of the concrete – the volume of the wall panels will be calculated by weight. Such a combination of coefficients and parameters of the blocks, you can expect a significant part of the characteristics of objects.

Conclusions. The efficiency of a combination of dynamic blocks, fields and attributes for working with data describing the objects is showed in the article. The use of attributes significantly reduces the time and minimizes the probability of errors when performing calculations in the data table.

In the future we plan to consider the possibility of exporting data from AutoCAD to Excel spreadsheet and insert the data back.

Literature

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