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Using of annotative styles in AutoCAD software

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The aim of this paper is taken attention the users to some AutoCAD functions that are permitted to effectively make technical documentation. In the paper there are discussed: rules of using annotative styles and methods of creating the technical documentation.

KEYWORDS: *AutoCAD, annotative styles, technical documentation*

Introduction

Nowadays, it is common practice to prepare documentation using computers and CAx systems. Due to the use of annotative styles in this process, designers can improve work and increase its precision, and in particular save the time spent so far on tedious and high-risk operations related to editing technical documentation.

Documentation made in CAD software is not only a collection of drafting drawings describing the object, but above all, a digital object model. The source of documentation in the AutoCAD model space can be both edge and spatial objects. Documentation from such a source can be fully used provided that one knows the principles (standards) of its creation. In other words, documentation prepared in the CAD program can be easily used at other stages of the design and investment process if it has been made in accordance with accepted and known principles.

In most cases, technical documentation is created in the area of plotting a given CAx system. The problem that should be noted is the adjustment of geometric parameters of the elements of the drawing description in relation to the scale of the viewport, in which these elements are to be found. This problem can be minimized with tools for automatically scaling the drawing description elements.

In the process of creating, editing or exchanging (archiving) electronic documentation, certain standards should be observed [1, 3, 4]. When several teams are working on a project, differences in line and text styles, colors, layer names or printout rules appear in the electronic documentation exchanged between them. Applying corrections by one team requires knowledge of the principles, according to which another project team created the documentation. The lack of agreed and accepted standards means unnecessary waste of time associated with adapting projects to own settings. Meanwhile, the use of annotative styles can facilitate and accelerate the work of people involved in the process of exchanging design data.

This paper is to draw the attention of users to some of the features of AutoCAD that ensure effective work with technical documentation.

Method of creating technical documentation - using annotative styles

In general case, methods of creating documentation are not systematized - it is difficult to refer them to the industry that a given user deals with, and it is not known what criteria to choose when classifying them. An attempt to classify the methods of creating documentation is presented in the paper [2]. It was proposed to make these methods dependent on two parameters related to each other: place, from which the printout takes

place (model area or plotting area), in combination with place to insert elements of the drawing description (model area, plotting area or model area available from the level of the area plotting - for work inside a viewport).

It is obvious that chosen method of creating documentation determines the scale of elements used for drawing description (text, dimensions, hatches, blocks). For example, dimension scale (Dimscale system variable) generally affects the geometric parameters associated with dimensional elements (e.g. controls the scale of dimension text or the size of arrowheads), but does not affect the parameters associated with tolerance values, measured lengths, coordinates or angles (parameters related to scaling of dimension values are stored in the Dimlfac system variable). Values of these system variables should be defined in such a way as to obtain strictly defined (usually the same within a single drawing) geometric parameters of dimensional elements - regardless of the scale of the printout or the scale of the viewport, in which these elements are introduced.

Methods of creating documentation for plotting from the model space or plotting area are defined in fig. 1. One method of creating documentation for the plotting case from the plotting area is the method using annotative styles. This method, called "LAYOUT/MODEL (use of annotative styles)", defines the introduction of drawing description elements in model space for printing documentation from paper space.

Fig. 1. Division of methods of creating documentation according to the place of printing and the place of occurrence of the drawing description elements

Fig. 2. Defining the sample block geometry in AutoCAD

Fig. 3. Defining the block and block description scale

This is preferred method for drawings created in AutoCAD since version 2008, for it is then possible to apply annotative styles for drawing description elements (text, dimensions, multi-leader, hatches, blocks and attributes). Manual specifying the appropriate scale values for drawing description elements in different scale

viewports can be troublesome. Therefore, AutoCAD enables automatic scaling of drawing description elements. In this method, it is not necessary to enter drawing description elements on layers for a given element type for each viewport separately (it is not necessary to create multiple sets of text objects or dimensions on different layers). Scaling the description elements allows to get their appropriate sizes regardless of the viewport scale, using a single set of drawing description elements. After creating the text or dimensions with new "annotative" parameter (using defined annotative style), one should assign each viewport a scale value of annotative elements - using a new drop-down list located in the status bar. AutoCAD automatically scales all objects marked as annotative in such a way that their sizes are exactly as assumed when creating the given annotative style (this can be explained as follows: if I create any annotative style, when defining geometric parameters of a given style, I refer them directly to print the given annotative element). As a result, the same dimensions are displayed in each of many viewports in the correct sizes, regardless of different scale values in those viewports.

Defining the sample annotative objects

Objects typically used to describe drawings have an "annotative" property that automates the process of scaling descriptions - thus they are printed and displayed in the correct size. Instead of creating multiple descriptions in different sizes and on separate layers, one can enable the "annotative" property by object or style, and set the description scale for the plot area or model space viewports.

Objects commonly used to describe drawings and having an "annotative" property are: text, dimensions, hatches, multi-leaders, blocks, and attributes. For annotative objects, the size should be defined directly related to the plot area (paper area). Description scale specified for the plotting area viewport and model space determines the size of description objects in these areas.

Defining an annotative object is shown on the example of an annotative block containing geometry of a disabled person's symbol. The first step in the block creation process should be to define geometry of the symbol on the layer for block elements.

To create an annotative block, after creating the block geometry: use the create block command (`_block`), indicate the insertion point and source block objects, and define the "annotative" block behavior. One can then export it to an external file using the file-export command. The block defined in this way will have a standard description scale of 1:1.

Another example of defining an annotative object is the annotative style of the text. To define the text style, the main parameters for the style are given (font, width factor, angle of inclination), while the value of the annotative parameter in relation to the text height should be understood as follows: given height of the annotative text refers to the required height of the text on the printout, i.e. regardless of the scale of the viewport, in which the text will be used; parameters defined in the text style directly refer to the documentation printout (thus, it is enough to define the quantitative parameters of a given text style once, and the program will adjust the scale of inserted text inside the viewport of any scale). Similar principles can be applied in the process of creating a multi-leader style or dimension style (fig. 4).

Fig. 4. Example of defining an annotative text style

Fig. 5. Managing annotative elements from the status bar

Annotative style management

Managing the state of visibility of annotative elements is possible due to the buttons on the AutoCAD status bar.

The *Description visibility* button (fig. 5a) determines whether all annotative objects are displayed or only those that comply with the current description scale. When description visibility is enabled (default setting), all annotative objects are displayed regardless of the description scale. When description visibility is turned off, only annotative objects that match the current description scale are displayed.

The *automatically scale* button (fig. 5b) determines whether the current description scale will be automatically added to all objects when description scale changes. The auto scale option is enabled by default. The *description scale* button (fig. 5c) sets the description scale for annotative objects on the model tab. Clicking the button displays a menu, where one can specify a description scale for the selected annotative objects.

Once created, the annotative object only supports the current description scale, but one can update it to support additional description scales set at different scales. Commands on the Scale panel Description card Describe are used for this purpose (figs. 6 and 7).

Fig. 6. Management of the scale of annotative elements from the level of tabs and panels

Fig. 7. Adding and removing a scale for an annotative object

For example, adding a 1:2 scale to an annotative block will result in a second instance of the block (geometrical elements of the block will be enlarged twice), the visibility of which is managed by the parameters of button *description visibility* or *defining the appropriate viewport scale*, in which the annotative block is used.

Summary

AutoCAD has introduced innovative tools, such as the ability to use annotative styles, which can undeniably improve the work efficiency.

The use of annotative styles and adoption of standards related to the creation of technical documentation will not ensure the correctness of input source data, however, they can increase the readability of documentation and simplify the transfer of data between individual CAx systems. They can also facilitate the cooperation of many entities involved in the design process. In this case, the problem is how to manage editing of documentation imported from one system to another (then such editing is only possible to a limited extent or even impossible). Practitioners know, however, that it is better to apply any rules or methods related to the process of standardizing the process of creating technical documentation, than not to apply them at all.

If someone collaborates with many people and exchanges fragments of documentation and uses team or network mechanisms, then he should adopt and apply specific rules related to creating documentation in AutoCAD. Application of annotative styles in this process can bring more benefits than problems.

REFERENCES

- [1] Warchulski J., Warchulski M., Szczurko J. „Standaryzacja dokumentacji technicznej w programie AutoCAD”. *Mechanik.* 11 (2009): 956–959.
- [2] Warchulski J., Warchulski M. „Metody tworzenia dokumentacji technicznej w programie AutoCAD”. *Mechanik.* 7 (2010): CD (article summary on the page 501).
- [3] Warchulski J., Warchulski M., Bużantowicz W. „Tworzenie elementów znormalizowanych w programie AutoCAD”. *Mechanik.* 7 (2013): CD (article summary on the page 601).
- [4] Warchulski J., Warchulski M. „Wykorzystanie tablic stylów wydruku w programie AutoCAD”. *Przegląd Mechaniczny.* 9 (2018): 26–28.