# USING PROGECAD SOFTWARE PACKAGE FOR CREATING SCHEMES OF ELECTRICAL INSTALLATIONS

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**ABSTRACT**
*In this paper, it has been presented a simple way of creating blocks made of different elements needed for a complete electroenergetic project, with relevant single line schemes. The paper emphasizes the explanation for the fast method of creating and inserting blocks, as well as the use of library blocks in ProgeCAD software package. It is assumed that the paperwork basics have already been done in ProgeCAD software package. The blocks are often to be predefined as far as the name and the size are concerned, and it is shown the method how to use the already given block to create a block of new characteristics. In the end, the example of the schemes of electrical installations made in ProgeCAD have been shown.*
**Keywords:** ProgeCAD, electrical symbol, block

## 1. INTRODUCTION
Schematic drawings of electrical installations in which various electrical engineering symbols can be inserted are used in electrical engineering in order to present the connection of an electrical engineering device (a machine, an appliance or controlling and regulating instruments). As certain symbols appear several times within the same drawing, blocks are used for the sake of better drawing organization as well as to promote the creating of the drawing. The blocks represent a string of mutually connected objects that act as a whole. In this paper, within the programme ProgeCad, a group of objects is used to form one single block with the determined scale factor so that it can be adjusted to the real dimensions within the drawing. The newly created block can then be used countless number of times or exported to another drawing. The components which often repeatedly appear in the drawing of electrical distributing installations of building units and for which the blocks are created are the following: doors, windows, sanitary ware, connection branches, switches, bulbs, etc. What is also important is that while creating a drawing, a special attention should be paid to the thickness of the lines drawn as well as the size of the symbols themselves.

## 2. CREATING AND INSERTING BUILDING FOUNDATION BLOCKS
As this paper assumes that completed building foundation (Picture 1) designed in ProgeCad is given, it is necessary to insert the blocks for doors and windows into the corresponding places within the foundation.
The best option is to create the blocks within zero-layer, and later to insert them into the desired layers with the additional colours. Thus the confusion with the colours of the blocks which could possibly be formed with different colours can be avoided. That is the entity which cannot be seen while saved within the drawing and which contains the name of the block, the basic point which serves as the reference for the inserted block and the objects grouped into a single block.

Several basic blocks which are used most frequently have been created for the drawing of the complete building foundation. The door block 100 is used as an example which shows the principle of creating of a block. the door block 100 consists of two objects , a rectangle and an arc. The Rectangle is drawn by choosing the command Rectangle whose dimensions are 5x100 cm. The arc us drawn with the command Arc, choosing Arc/Start, Centre, Angle. The upper left point of the rectangle is chosen as the starting point of the arc. The left point of the rectangle is chosen to be the centre of the arc while the rotation angle is -90°. The block of the door 100 is created by choosing Draw command Make Block from the Tool Bar. Its activation indicates the appearance of the window Block Definition. The title of the door block is being inscribed into the part of the Name window. The upper left angle of the door is chosen as the basic point within the Base Point Part. The door is selected within the Objects part. Afterwards , Block Definition window returns by clicking Enter and then OK is chosen. It should be mentioned that within the Block Definition window, there are three buttons within the Objects part and Delete should be chosen among one of them, which means that the objects are automatically deleted after the block has been defined. Delete option is activated if the block is used with the different scale, orientation or location regarding the objects which come as parts of the block.

All the blocks included in this paper have been created in  similar way so that it is not necessary to give separate explanation for each of them whether the installation blocks or the building foundation blocks are concerned.
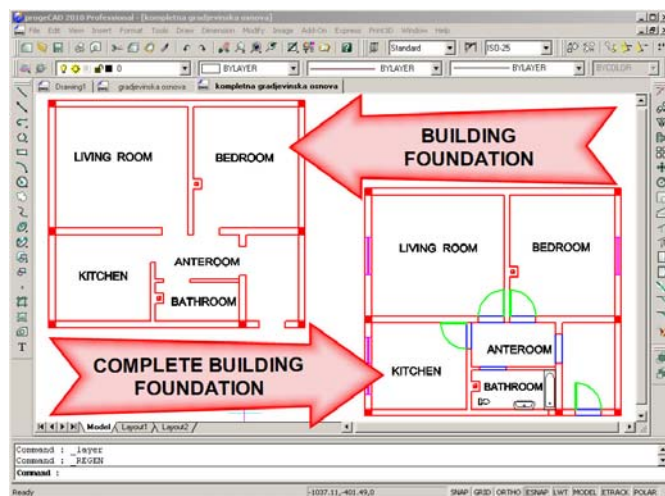


*Picture : The layout of the building and complete building foundation*

Before the blocks have been inserted in the drawing, it is necessary to form new layers where the blocks will be placed. To this effect, two new layers with the corresponding colours are created: purple that matches with windows and green that  matches with doors. Layers are created because it is necessary to have greater number of levels within one particular drawing. These levels conation objects from the same group so that later they could be temporarily removed from the current layout of the drawing. Temporary removal of one layer means simultaneous removal of all other elements which belong to it and it is done within the window for the dialogue Layer Properties Manager. Chosen layer can be switched on of off, frozen or defrosted , locked or unlocked which is done by a simple click on the corresponding column of the chosen layer.

Block insertion is done by choosing the command Insert Block on the Draw Tool Bar. Calling this command, the dialogue window Insert is opened. This window contains three fields where parameters which need to be defined in order to insert the created symbols are grouped. The field Insert contains the list where the names of all the created symbols of the activated drawing are placed. The name of the inserting block can be selected here. There are several options within another field Positioning, while the option Insertion point is used for adjusting the parameters which define the point of the block insertion into the drawing. The defining of the scale factor on coordinate axes for the inserting

symbol is done within the field Rotation angle. The option Position block when inserting should be switched on in order to insert the value of the scale factor in coordinate axes, as well as to define the scale and rotation angle of the inserting symbol. For example, scale factor on X axis controls the size of the block horizontally as well as its direction ( minus symbol in front of the value defines the direction). If the field Explode blocks upon insertion in the lower left corner is switched on, than each block will be exploded into the component parts upon insertion so that this option is not used very often since the block can be exploded later on. The third field Multiple blocks enables creating of the multiple copy for the corresponding block.

In this particular case of the presented building foundation, for the insertion of the door block in the central part of the object whose width is 110 cm, it is necessary firstly to zoom that area within the drawing, to make the door layer as the current layer and then to start command Insert Block. The door 100 is chosen on the drop menu and it is checked whether the option Position block when inserting is switched on with all three fields, while the field Explode blocks upon insertion is switched off. Clicking OK, it is back into the drawing while the 100 block is connected to the cursor and the point which is chosen as the basic, is placed in the middle of the cursor. It is checked whether Esnap criteria Endpoint is switched on, then the cursor is moved to the right lower end of the doorway of the front door. When the square appears, it is necessary to click, which means that the block insertion point has been chosen. The message for the input of the scale factor on X axis appears on the command menu: Corner/xyz scale factor‹1›. It is necessary to insert the value ‹-1› as the scale factor and click Enter afterwards. The value 1 is inserted as Y scale factor and Enter is pressed afterwards, while the offered angel, i.e.0°, is accepted as the rotation angle, and later Enter is pressed as well. This is the final step of the insertion of the particular block and the remaining doors and windows are inserted in the familiar way. It is not necessary to make blocks for the upper part to the doorway since they are presented as straight lines. This is the final phase of the building foundation.

## 3. INFORMATION EXCHANGE BETWEEN DRAWINGS

It is necessary to copy the drawing in the new file so that the existing drawings and their elements could be used with a new name within further operation. It can adjusted which part of the drawing is visible, since the ProgeCAD enables supporting of several open drawings simultaneously. If several drawings can be seen simultaneously ( Picture 2), each object or all of them can be copied from one into another file.
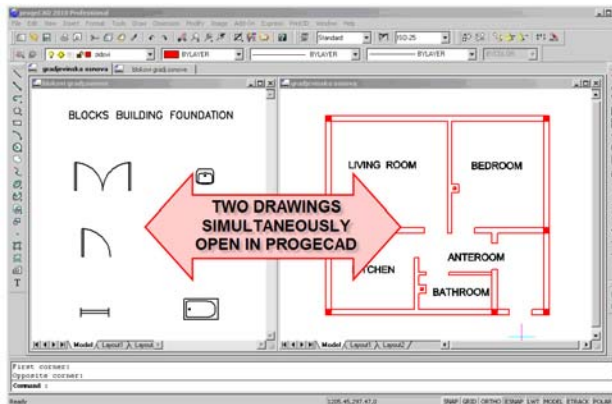


*Picture 2: Two drawings simultaneously open in ProgeCAD*

While the building foundation drawing is open, File/Open is chosen. Then the file Select File window which contains building foundation block is chosen and the Open button is pressed. Window/Tile Vertically is chosen on the drop menu afterwards, which enables the appearance of the drawing with the blocks of foundation besides the building foundation drawing. Only one separate drawing can be adjusted instantaneously , while the border of the activated drawing is dark blue in colour.

If the drawing of the complete building foundation should be created within new file, it is necessary open new file, copy the building foundation and building foundation blocks in it and insert the blocks

in the drawing. When the completed building foundation is finished, it is necessary to open new file entitled electrical installation scheme (for the given building foundation). The insertion of the electrical labels and symbols blocks needs to be done within the created file.

What should be mentioned is that the way of making all the lines (one or more) as one single line has been widely accepted as the most frequent way of drawing the schemes of electrical installations. That particular line denotes only the direction of the lines while on the basis of the additional connecting places it can be easily concluded how many electrical circles there are. The easiest and the most efficient way of drawing is to draw the complete route of electrical lines firstly and then to insert already created blocks of electrical elements.

## 4. BLOCKS INSERTION FROM ALE BLOCKS LIBRARY

Besides creating new blocks for an electrical power project even completed blocks from the existing library of blocks can be used. Operating with blocks in ProgeCAD is improved by adding ALE library of blocks (Picture 3), which owns more than 10 000 complete blocks upon all installations where new blocks can be added as well. ALE enables operating with categorized blocks, blocks survey as well as the adjustment of the scale factor and rotation angle.
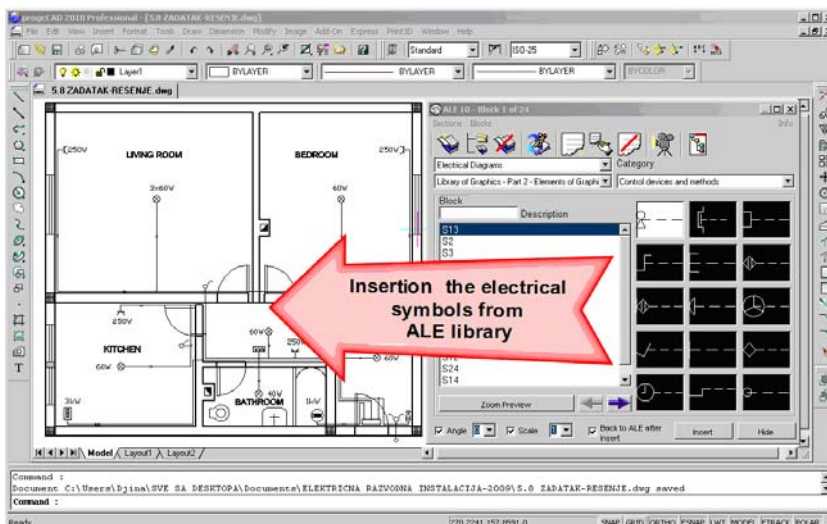


*Picture 3: Insertion of Electrical Symbols from ALE Library*

## 5. CONCLUSION

Contemporary age requires quick creation of electrical installations drawing, the possibility for their easy exchange, simple and fast information exchange between drawings, which demands their creation in electronic mode. Span for electrical installations scheme creation is even shorter , while the requirements are more and more complex. These requirements are fulfilled with using the software suits for creation of technical drawings and this paper shows the application of Proge CAD. It should be emphasized that operating with blocks in ProgeCAD is improved by adding ALE library of blocks.

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