MONOMAKH-SAPR

Software package for analysis & design of reinforced concrete and masonry structures of multi-storey skeleton-type buildings

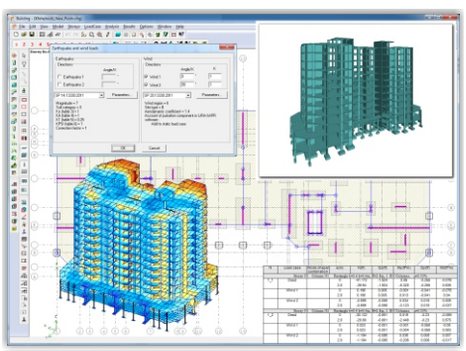
MONOMAKH-SAPR software is intended for analysis and design of monolithic reinforced concrete structures and structures with brick walls. It is possible to perform analysis of the whole structure or its separate parts and generate working drawings and reinforcement patterns for structural elements.

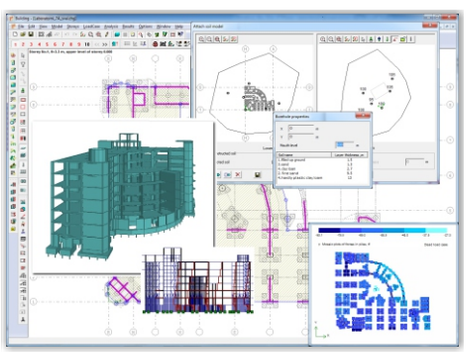
In MONOMAKH-SAPR environment an engineer could use standard technical terms, such as column, beam, slab, opening, surface load, etc. Working drawings or sketches of working drawings are generated in automatic mode and later may be modified in AutoCAD (through export by DXF file).

MONOMAKH-SAPR program is highly profitable for analysis of structures of residential and public multi-storey buildings. The software is helpful when you take design decisions, make individual projects with arbitrary room layout, have much of design work and make an appraisal (expert judgement) of completed projects.

Building codes of Ukraine, Russia as well as Eurocode are supported.

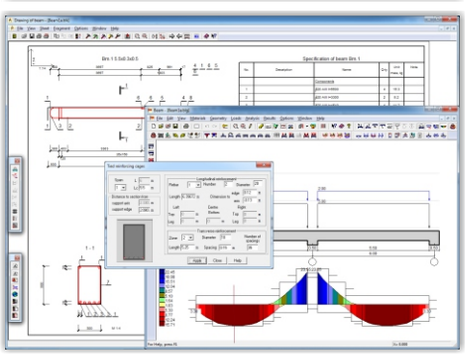
BUILDING - analysis & design of multi-storey skeleton-type structures from monolithic reinforced concrete and structures with brick walls





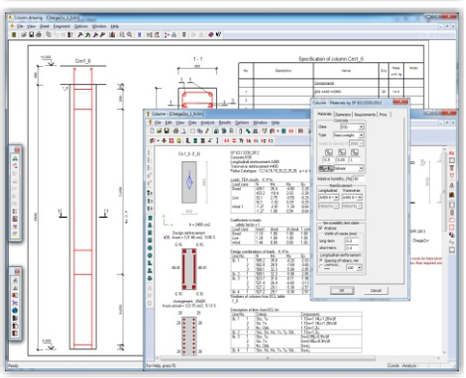
Model of the structure is generated from structural elements: columns, beams, walls, partitions, floor slabs, mat foundations and piles.
Service options (such as to create additional grids on the plan, move and rotate the origin, copy, move, rotate, delete, edit properties of one or group of structural elements, copy storeys) reduce time necessary for model generation and enable you to design the model in several variants.
Vertical and horizontal loads are defined as distributed across the whole area or across part of the slab or as concentrated forces.
To consider wind and earthquake loads, it is necessary to define region of construction and direction of load.
Design model of the structure is generated automatically. There are easy-to-use modes for defining different design features, such as: beams and slabs may be supported by columns and walls in different ways (hinge, rigid, with eccentricity or no); slabs and walls may be supported by floor slabs; different sections for columns and beams, different shapes of openings, etc. Loads are defined either on the whole slab or on its part. For wind and earthquake loads, only direction of load should be defined. It is possible to increase stiffness of soil and pile foundation in earthquake and wind loads. Static and dynamic analyses may be carried out. Computer simulation of assemblage (erection) process is available. To start this mode, you could define number of storeys for a certain stage of assemblage. Special mode for unification of columns: it is possible to unify columns by different criteria (by storeys, for separate chords, by percentage of reinforcement). Unified types may be exported to COLUMN module. Program displays data about determined sections of elements or about insufficient input data. Bill of materials as well as table with frequencies and periods of vibrations is generated. Animation of natural vibrations enables you to evaluate whether the generated model is correct.
Data may be exported to design modules BEAM, COLUMN, FOOTING, SLAB, ELEVATION (WALL), BRICK. It is also possible to export data to LIRA-SAPR and DEF-PC software and import design model from AutoCAD, Revit, Allplan, ArchiCAD.

BEAM - analysis & design of monolithic RC beams



BEAM module enables you:
– to analyse and design monolithic RC multispan beam with different height of the section in various spans;
– to import design model from BUILDING module or generate it in stand-alone mode;
– to analyse beam according to ultimate limit states and serviceability limit states;
– to obtain envelope lines for displacements, forces;
– to determine necessary reinforcement;
– to obtain material diagram;
– to use welded or tied reinforcing cages for the beam;
– to arrange reinforcement, draw the beam and generate DXF file of drawing.

COLUMN - analysis & design of monolithic RC columns



COLUMN module enables you:
– to analyse and design monolithic RC column of different cross-section (rectangular, I-section, T-section, cross and angle sections, ring section, etc.);
– to import design model from BUILDING module or generate it in stand-alone mode;
– to analyse column according to ultimate limit states and serviceability limit states;
– to determine necessary reinforcement;
– to consider (for pylons) specific location of reinforcement along long sides;
– to arrange reinforcement, draw the column and generate DXF file of drawing.

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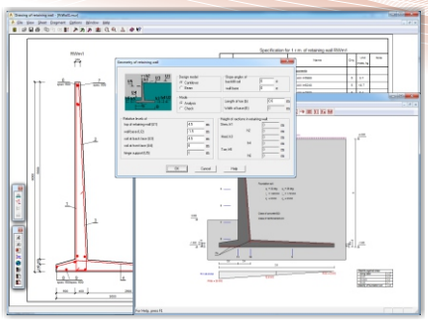
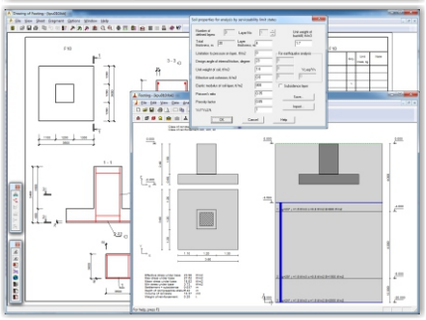
MONOMAKH-SAPR

REWALL (Retaining Wall) - analysis & design of retaining walls



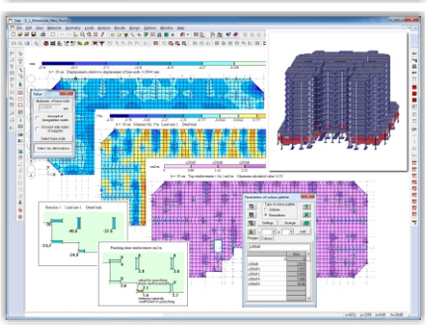
REWALL module enables you:
– to analyse and design monolithic reinforced concrete angle-shaped retaining wall for the specified geological properties of the site;
– to check the massive retaining wall;
– to generate model in stand-alone mode;
– to analyse retaining wall according to ultimate limit states and serviceability limit states;
– to determine necessary reinforcement;
– to arrange reinforcement, make drawing and generate DXF file of drawing.

FOOTING - analysis & design of column footing



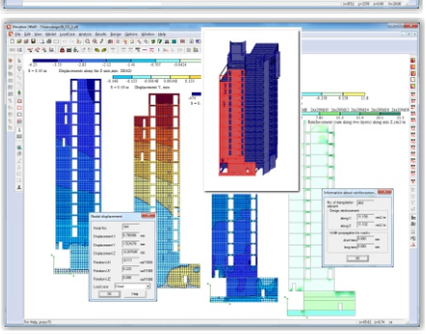
FOOTING module enables you:
– to analyse & design RC monolithic footing for columns for specific geological properties of the site;
– to import design model from BUILDING module or generate it in stand-alone mode;
– to perform calculations of soil and footing;
– to determine necessary reinforcement, arrange it and draw the footing.

SLAB - analysis & design of monolithic RC floor slabs and foundation slabs



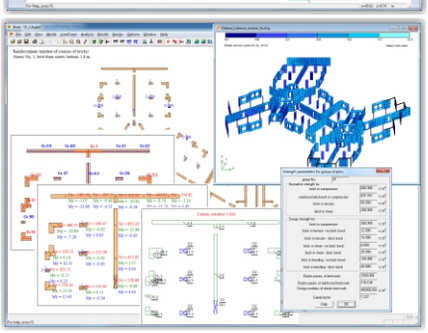
SLAB module enables you:
– to analyse & design monolithic RC floor slab, and foundation slab on natural bed or on pile footing;
– to import design model from BUILDING module or generate it in stand-alone mode. Slab contour may be of arbitrary shape. Variable thickness of the slab and specified holes are taken into account;
– to analyse the slab together with beams;
– to define regions with different soil properties (for foundation slab);
– to consider behaviour of slab in the whole framework (account of displacements at nodes where slab joins the framework);
– to obtain contour plots of displacements and forces, diagrams for the specified line segments, contour plots of stress under the base of foundation slab or mosaic plots of forces in piles;
– to analyse slab according to ultimate limit states and serviceability limit states;
– to determine necessary reinforcement, obtain contour plots of design reinforcement, use reinforcing cages and rebars for the slab, arrange reinforcement and draw the slab.

ELEVATION (WALL) - analysis & design of monolithic RC walls



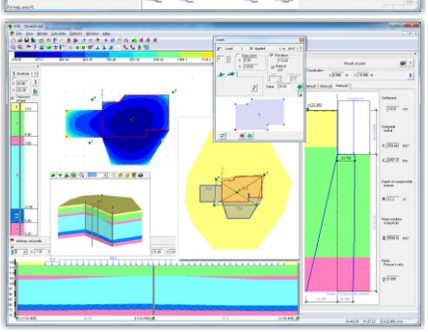
ELEVATION (Wall) module enables you:
– to analyse & design monolithic RC wall of arbitrary contour together with adjacent frame structures;
– to import design model from BUILDING module or generate it in stand-alone mode. Variable thickness of the wall and specified holes are taken into account;
– to consider behaviour of wall in the whole framework (account of displacements at nodes where wall joins the framework);
– to obtain deformed shape of the model, contour plots of displacements and stresses for elements of the wall, diagrams of design forces for bar elements;
– to analyse wall according to ultimate limit states and serviceability limit states;
– to determine necessary reinforcement, obtain contour plots of design reinforcement, use reinforcing cages and reinforcing bars for the wall, arrange reinforcement and draw the wall.

BRICK - analysis & design of brick walls



BRICK module enables you:
– to analyse the whole model of the structure with account of combined behaviour of brick walls and RC items;
– to carry out strength analysis of masonry for the specified masonry levels;
– to analyse separate parts for the specified levels of brick walls;
– if reinforcement is required, to determine at which intervals (number of brickwork rows) the reinforcement cages should be located and to make appropriate darwings.

SOIL- calculation for moduli of subgrade reaction



SOIL module enables you:
– to generate 3D soil model according to specified geological properties of the site;
– to define database of properties for soil layers;
– to specify arrangement and upper levels of boreholes, define soil layers in a borehole;
– to specify arbitrary surface loads from existing structures and structures under consideration as well;
– to compute fields of soil settlements and rigidity of elastic foundation (subgrade moduli) according to different criteria;
– to export calculated subgrade moduli (variable across the foundation slab) to BUILDING and SLAB modules where they are used for analysis of footings and foundation slabs.foundation slabs.

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