MONOMAKH-SAPR

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

Modern concepts of computer-aided analysis and design in Windows Vista/7/8

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.

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 - 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 loads are defined as distributed across the whole area or across part of the slab and as distributed along the line and concentrated forces. Horizontal loads are defined either at the floor slab level as linearly distributed and concentrated forces, or perpendicularly to the plane of walls as forces distributed non-uniformly across the area. Dead weight of structural elements is considered automatically. To consider wind and earthquake loads, it is necessary to define region of construction and direction of load.

Preliminary analysis and FEA are performed. During FEA, FE model is generated automatically, static and dynamic analyses are performed. As a result, the following parameters are determined: displacements at nodes, forces and stresses in finite elements, total loads on walls and columns for the specified load cases, table for frequencies and periods of vibrations. Animation of natural vibrations provides additional data for evaluation of the model.

By results of every analysis, sections of structural elements are preliminary checked, then the program generates bill of materials with price for the structure.

It is possible to evaluate model of the structure and find out optimal design solutions.

The data could be exported to the following design modules: BEAM, COLUMN, FOOTING, SLAB, ELEVATION, BRICK.

It is also possible to export model to LIRA-SAPR program. Data about loads on footings may be exported to DEF-PC program.
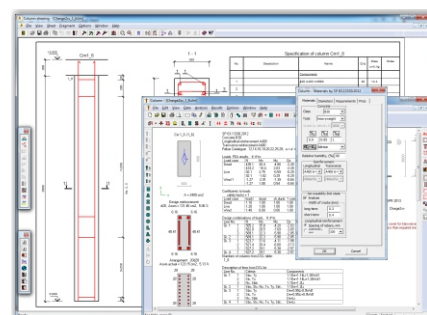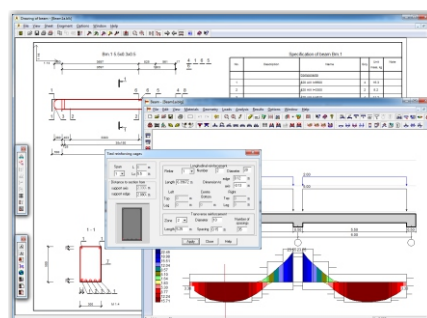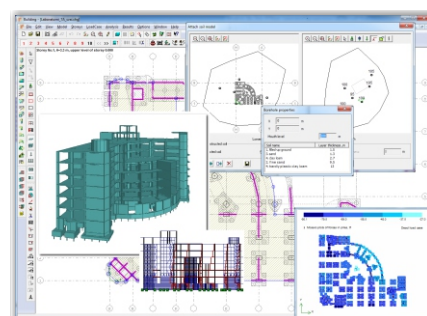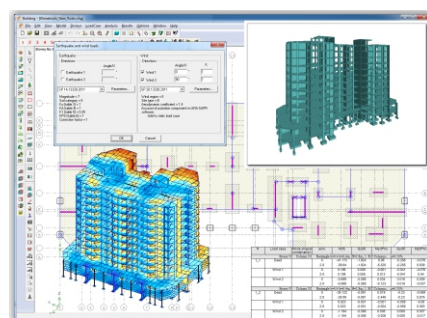
■ BEAM - analysis & design of monolithic RC beams

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.

Project of residential building in the shortest possible time...

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

REWALL module enables you:
– to analyse & design monolithic RC 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 perform calculations of soil and retaining wall;
– to determine necessary reinforcement, arrange it and draw the rewall.

■ 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, take into account the flexibility of supports;
– to define regions with different soil properties (for foundation slab);
– 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 export design model to LIRA-SAPR program;
– 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.
– to arrange reinforcement, draw the slab and generate DXF file of drawing.

■ 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 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 export design model to LIRA-SAPR program;
– 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 consider that floor slabs are eccentrically supported by brick walls;
– 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.