SOFTWARE FOR OPTIMAL CUTTING OF SHEET MATERIALS

**Description**
The strategy of global optimization is based on generating a set of cutting charts with subsequent choosing of the best layout from the viewpoint of the minimum efficiency function value. The global optimization chart is shown in the figure below. For a prescribed orientation of components, any rearrangement of the elements and plates is a local extreme point of the efficiency function in the combinatorial space. As in genetic algorithms, the first stage of global optimization involves random search for the best efficiency function value in the entire combinatorial space of rearrangements. The point corresponding to the best function value is taken as the center of a new search neighborhood with a radius smaller than that of the search neighborhood at the previous stage of optimization.

**Technical appraisal and economic benefits**
- arbitrary number of components and plates;
- arbitrary shape of components and plates;
- tolerance of the distance between the components on the plate.

**Input data:**
- component and plate contours are composed of elliptical arcs and segments.

**Application area**
Machine building, leather and textile industry.
The application area of the developed approach for solving applied problems in industry is very wide, which is caused by universality of the method and optimization problem.

Examples of possible software applications are given below:
- optimization of the arrangement of radio components on a plate with minimization of the connecting path length;
- optimization of the arrangement of objects with a specified center of mass: design of arrangement of turbine blades, units and elements of satellites and submarines, etc;
- design of industrial objects: optimization of internal transportation costs;
- calculation of optimal trajectories for a given region;
- optimization of transport schedules: air transports, railway transport, buses;
- optimization of timetables at schools and colleges;
- optimization of object arrangement in warehouses;
- scientific and engineering problems of minimization of a numerically specified arbitrary function of a large number of discrete variables.
Development stage
The software system was implemented in the Inova company (Slovenia).

Patent situation
No application was submitted.

Commercial offers
Development of a software system for computer-aided machines. Software modification for a particular branch of industry.

Estimated cost
To be discussed.

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