SECTION 7. Mechanics and machine construction.

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APPLICATION OF UNIFIED MODELING LANGUAGE FOR SOLVING ENGINEERING

The author explores the process of combination of high-performance processors of information technology as applied to the design of planning and methodology for building reliable special road cars.

World practice of a modern road engineering is based on the classical methods of settlement received in the past century. Most of these techniques are computerized and automated, but they are scattered and do not have a common organizational component.

It was concentrated to obtain the overall conceptual information processing methodology for the design and creation of road vehicles in order to increase the speed of settlement processes is the main thrust of this research.

Development of a methodology settlement searchable database of road machinery in the scientific paper based on the use of modern object-oriented language, Unified Modeling Language and the application of the product IBM Rational Rose Enterprise.

Keywords: Road car, object-oriented programming, Unified Modeling Language, IBM Rational Rose.

1 Introduction

In today's circumstances, the establishment of settlement processes and databases of special road vehicles can no longer do without the object-oriented technologies. The object-oriented paradigm divides the application into smaller elements that are then assembled into one large common interface to develop a special machine [3].

Effective use of information technology in the task to ensure the best conditions of transport and technological complex of special machines - can not

be underestimated at this stage of general mobilization. How to reduce time spent on the design process of dynamic loads of special machines using modern information systems (in particular the universal system of mathematical calculations MathCAD Plus) [1], while maintaining a given level vibronagruzhennosti, just focus on the development of the author.

Thus, extensible, and scalable data base obtained with the object-oriented technology can then be supplemented with current design techniques.

2 Theoretical part

Previously it was thought that the creation of software - the creative process is completely dependent on the programmer. At the moment, this process can be put to industrial rails, releasing them from routine tasks and the errors in decision making.

Rational Rose Enterprise Edition - a package that was applied in this study will facilitate the development of complex software systems, has enabled easy and fast algorithms to describe relationships between objects and allowed on the basis of graphical diagrams to create the source code of programs [2].

Created in the same style UML (Unified Modeling Language) class diagrams are clear to any programmer, who will study the resulting concept of the calculation base, go to code the program (in this case - to refine the code) [3].

The author of this article conducted a study on the construction of an object-oriented system of research and the creation of special road cars. In this case, the software object-oriented approach is used to structure the application of the calculation base and visualization systems designed road cars.

The first speaker unit Produce analysis system that provides:

— choice of tasks from the entire set of data describing the model;

— consistency problems in the form of diagrams for storing them in a repository;

— content of comments in the charts for fixing design solutions;

— for dynamic modeling in terms of events create the project.

Thus, building the first diagram - diagram of the problem-solving concepts Class diagram. Chart contains a list of operations that the projected system in the solution of the problem [3].
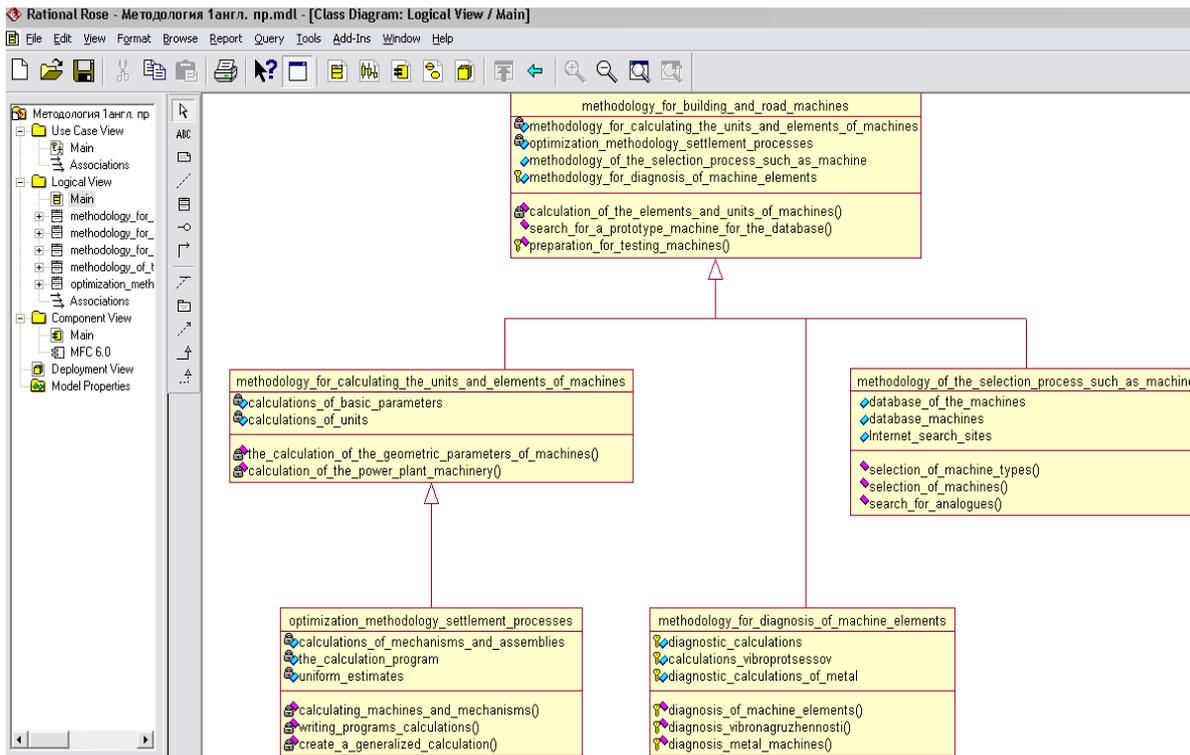
Pic. 1 - The class diagram (Class diagram) to solve the problem of search and selection process automation in the design of a special machine.

After defining the specific purpose of payment transactions is carried out from a chart, displayed in Fig. 1 and select a specific implementation road car, which will be calculated. For this we construct the following class diagram Selection. In Fig. 2 shows the class diagram, which is detailed, the basic types of road vehicles and their component parts and operations that perform installations of these machines.

Each class diagram as it is, is divided into attributes and operations are class. At the further conduct of the encoding diagram of one of the programming languages, each class member will take his position in the development of the code.
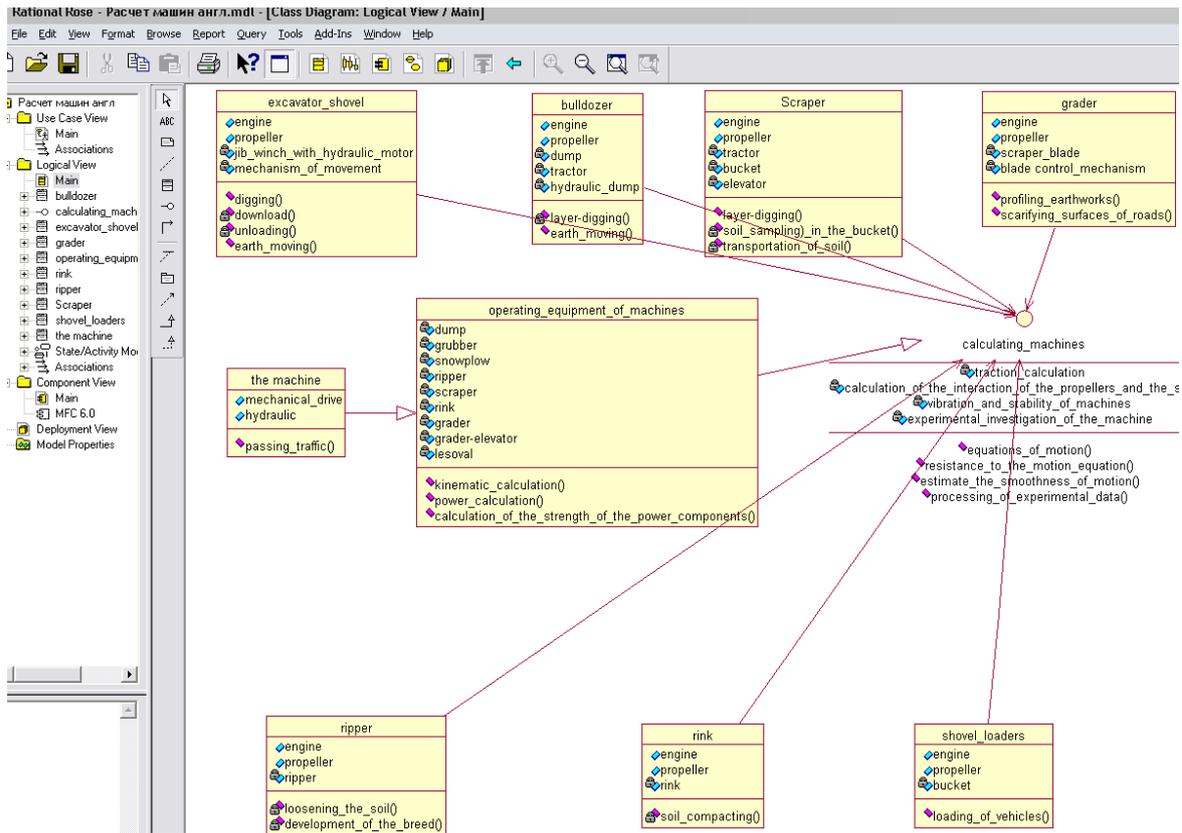
Pic. 2 - The class diagram (Class diagram) to select the type of special machines.

When modeling the behavior of designed or analyzed system there is a need not only to present the process of changing its states, but also detail features of algorithmic and implementation of the system's logical operations.

Modeling of processes of operations separate elements machines made using activity diagrams (Activity diagram) [2]. The primary purpose of the activity diagram is a visualization features of realization of operations of classes when necessary to present algorithms for their implementation. All of the states in the diagram of the car corresponds to the projected performance of an elementary operation, and the transition to the next state is only performed at the end of the operation.

In the context of the UML activity (activity) is the process of separate calculations performed by the system, which lead to a certain result or action (action). The diagram shows the activity of the logic and algorithmic transitions from one activity to another, and the analyst's attention is focused on results. Result of the activity can lead to changes in system status or return some value.
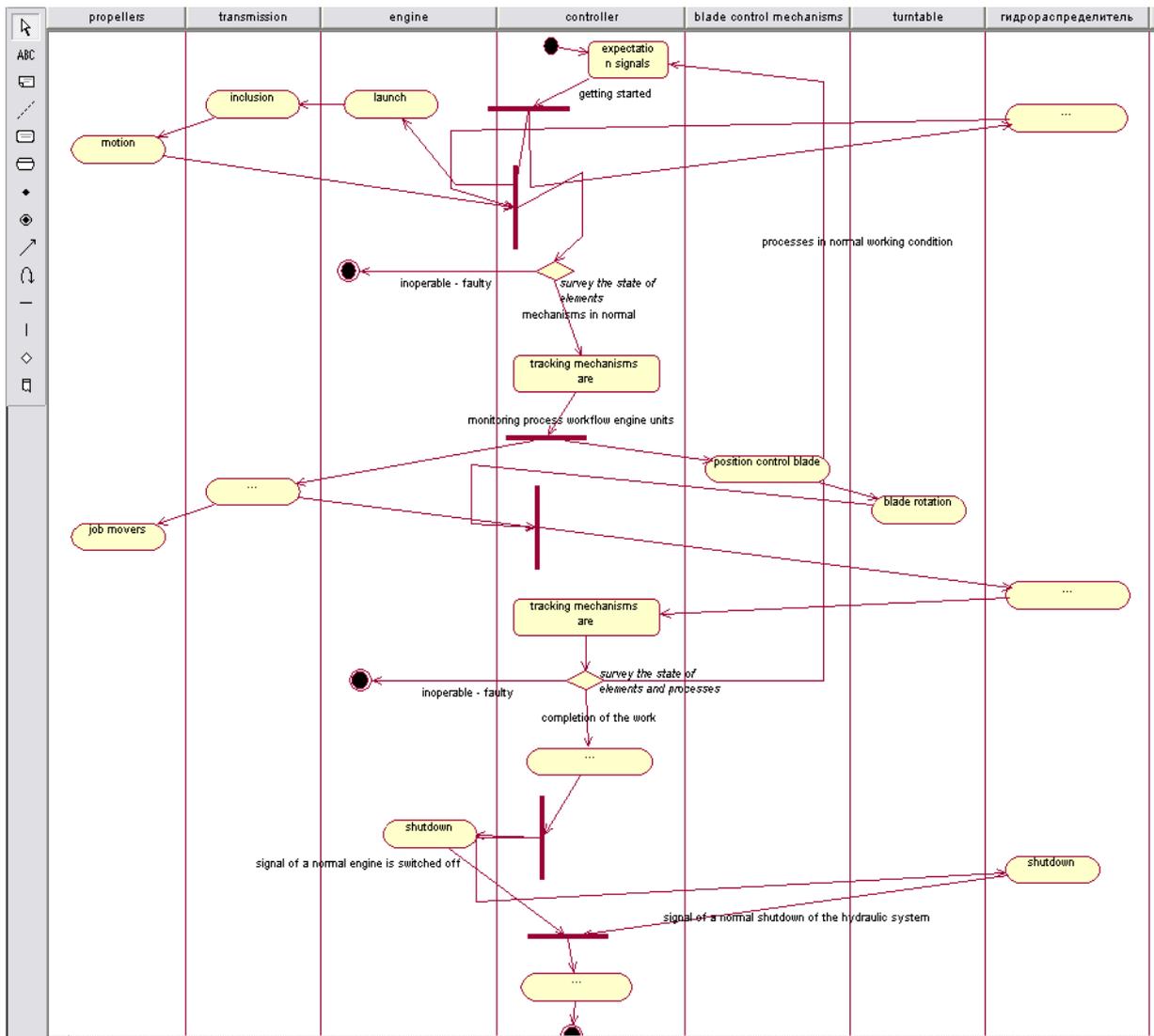
Pic. 3 - Activity diagram (Activity diagram) shows the algorithm of the information system for the creation of an automated calculation base machine.

The chart shows the behavior patterns of activity objects, but, just as important, to accurately represent the sequence of object interactions with each other. The exchange interaction takes place in a specific sequence, and this process beautifully displayed using sequence diagrams (Sequence diagram) [2]. Obtained by the process of displaying the relationship of objects in time.

The main emphasis of a sequence diagram, displayed in Fig. 4 - the order and dynamics of behavior, how and in what order events occur.
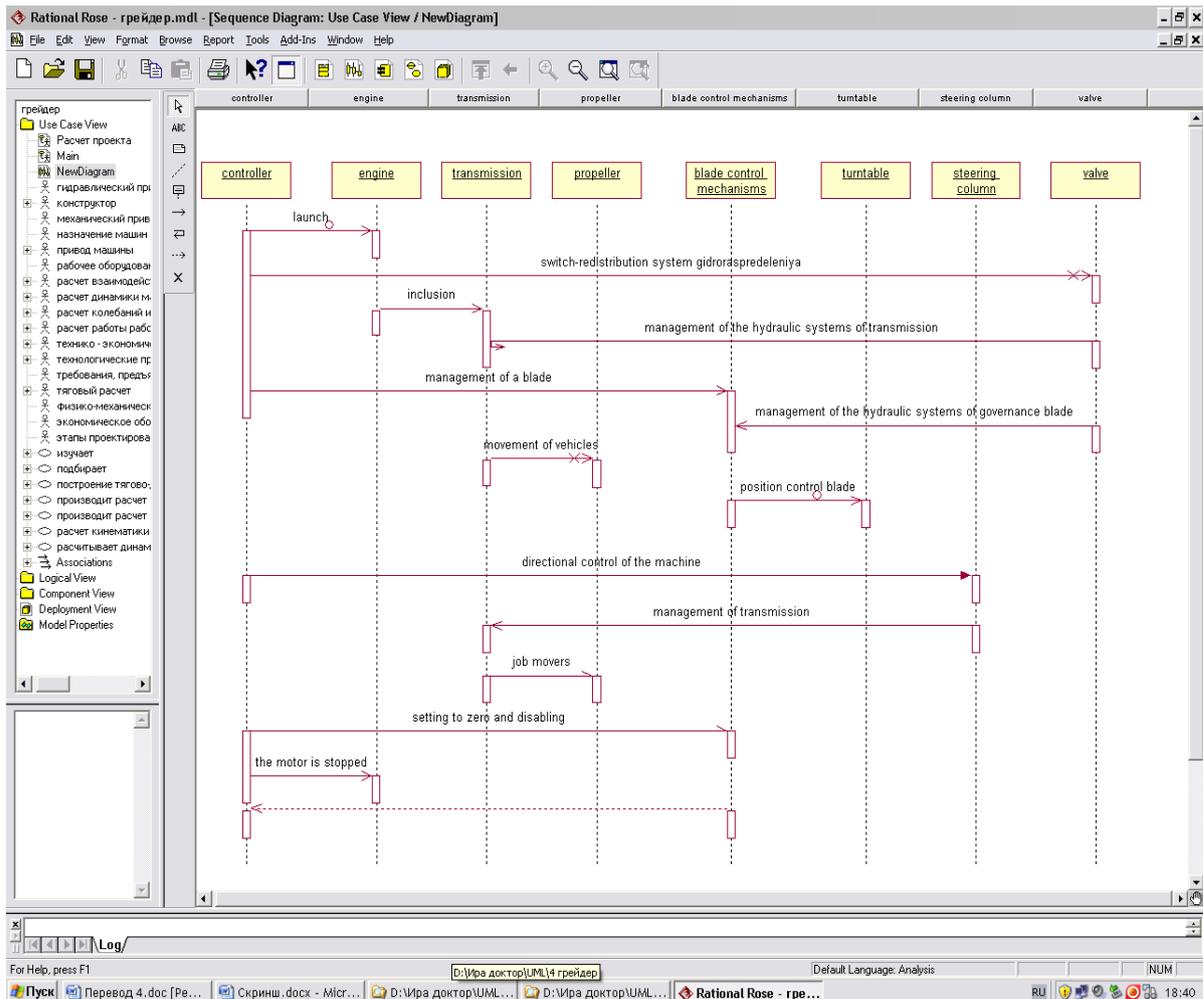
Pic. 4 - The sequence diagram (Sequence diagram) is a reversal of the projected object interaction system in time.

Thus, building the necessary charts, it can be said that the main task of the information system being designed to create a special machine is displayed. The next block design in the context of object-oriented approach - the coding of objects on one of the well-known algorithmic languages. In this case, we chose C + +. To create your project, the key code diagram Rational Rose class diagram (Class diagram).

A class diagram is a graph whose vertices are the objects of the "classifier", connected by various types of structural relationships. The class diagram shows the relationship between the individual entities subject area, and describes the internal structure and the types of relationships.
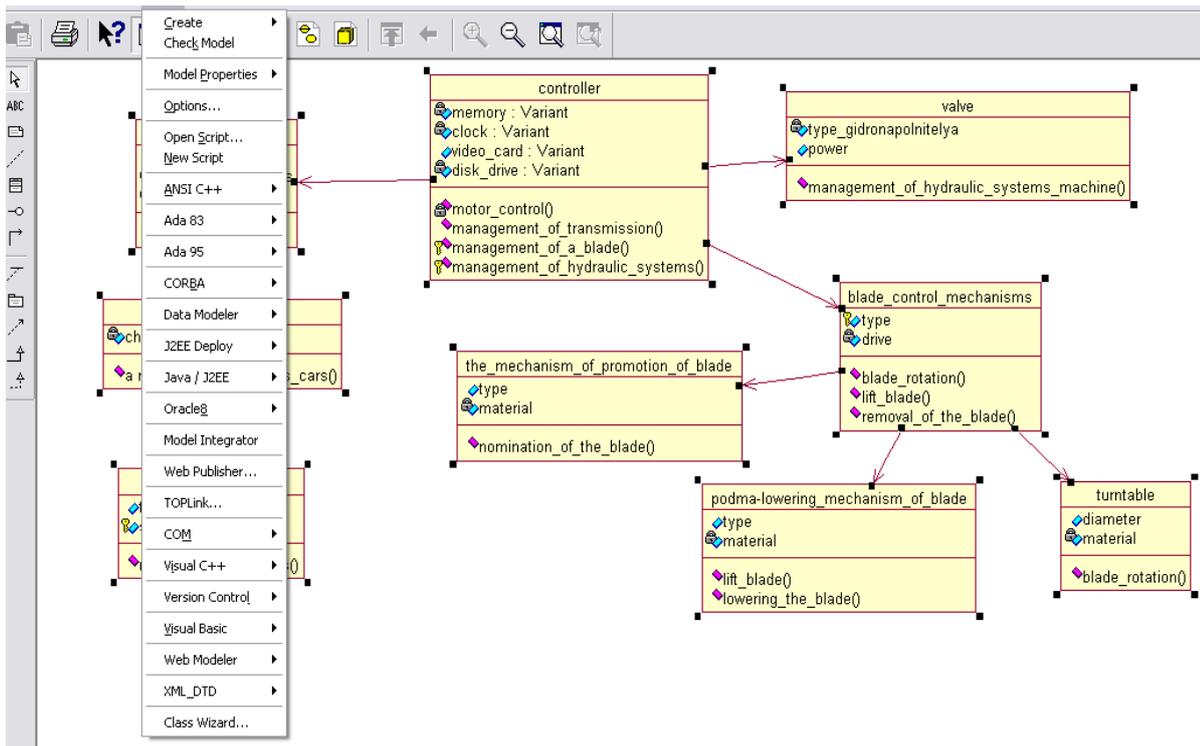
Pic. 5 -The class diagram (Class diagram) presents the concept of system objects.

Dalle based on class diagrams created the internal structure of the system is described by inheritance, and the relative positions of the classes from each other. In the class diagram describes the logical view of the system. Classes - harvesting facilities, on which will be defined physical objects.

After the encoding on vybrvnny programming language you are automatically taken to the program of Microsoft Visual C + +, create a template library MFC (Microsoft Foundation Classes) [2].

Thus fulfilling the principles of object-oriented programming:

—   full support of the design process the application;

—   the opportunity to work with the libraries of MFC, search and selection;

—   the possibility of the user interface;

—   code generation in the algorithmic language of the charts;

—   reengineering code and make changes directly to the system model;

—   the presence of controls that allow you to identify errors during the design phase and the implementation phase of the project.
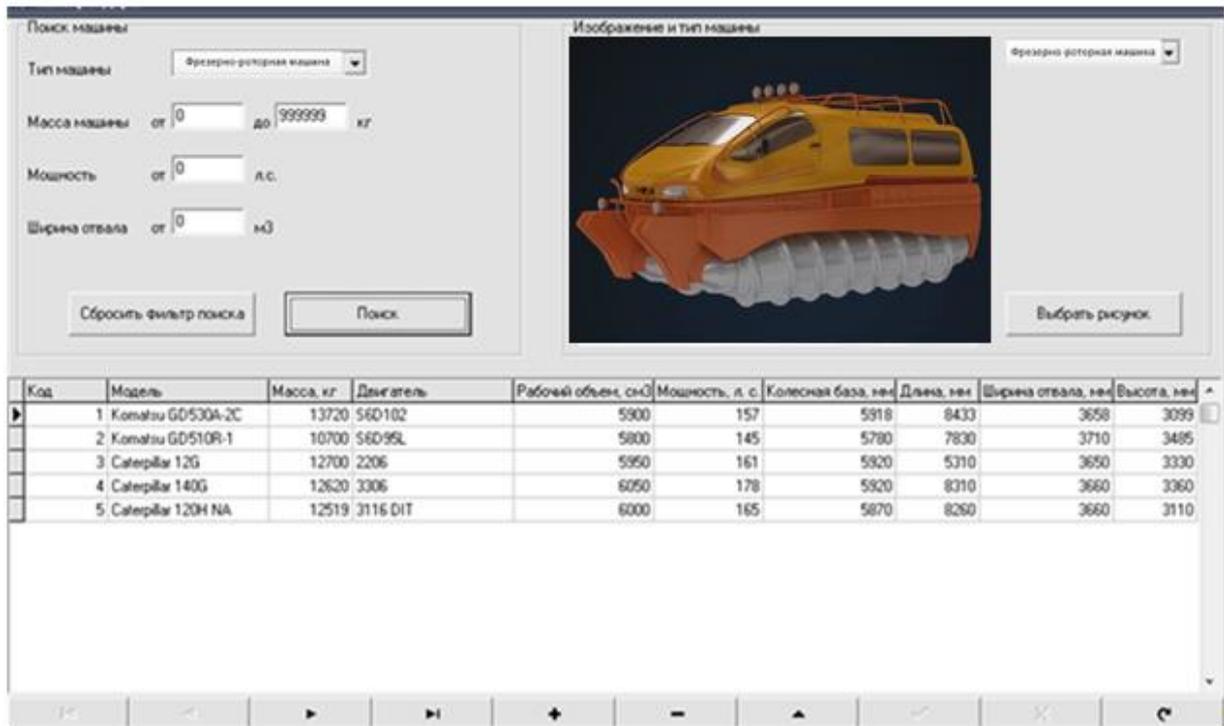
**Pic. 6 - One of the outcomes of the project - the creation of a single database rotary screw machines.**

In Fig. 6 shows an example of the final development of a common structured system: Calculated base of special road machines: rotary screw machines. Rotary screw machine is selected as an example not by chance - for the past 20 years, the author of this study conducted research in the dynamics of propulsion overgrown rotary screw machines.

Thus, the synthesis methodology of three leading experts - Booch, Rumbaugh, Jacobson beautifully demonstrated the process of automating the analysis and design phases of the software when creating road cars. Since UML methodology is fully scalable, the emergence of new techniques and visualize projects for Rational Rose is not a problem. Rational Rose allows you to create high-level and low-level models at the abstract or logical level, performs forward and reverse engineering. [3]

CASE-technology when used in the creation of special road vehicles provide all project participants, including customers, holistic stringent visual and intuitive graphical interface that allows to obtain clear notation with a simple and clear structure. Calculated and visualized diagram represent two-dimensional schemes (easier to use than the multiple-description), allowing the customer to participate in the development process, and developers - to communicate with domain experts, to distribute the work of systems analysts, designers and programmers, providing ease of maintenance and changes in the the system. Thus greatly increasing the speed to create projects of modern machines.

The study also considered the possibility of further expansion of problems to be solved to create special road cars.

A diagram of classes - Fig. 7 for diagnosing packet units already established road machines.
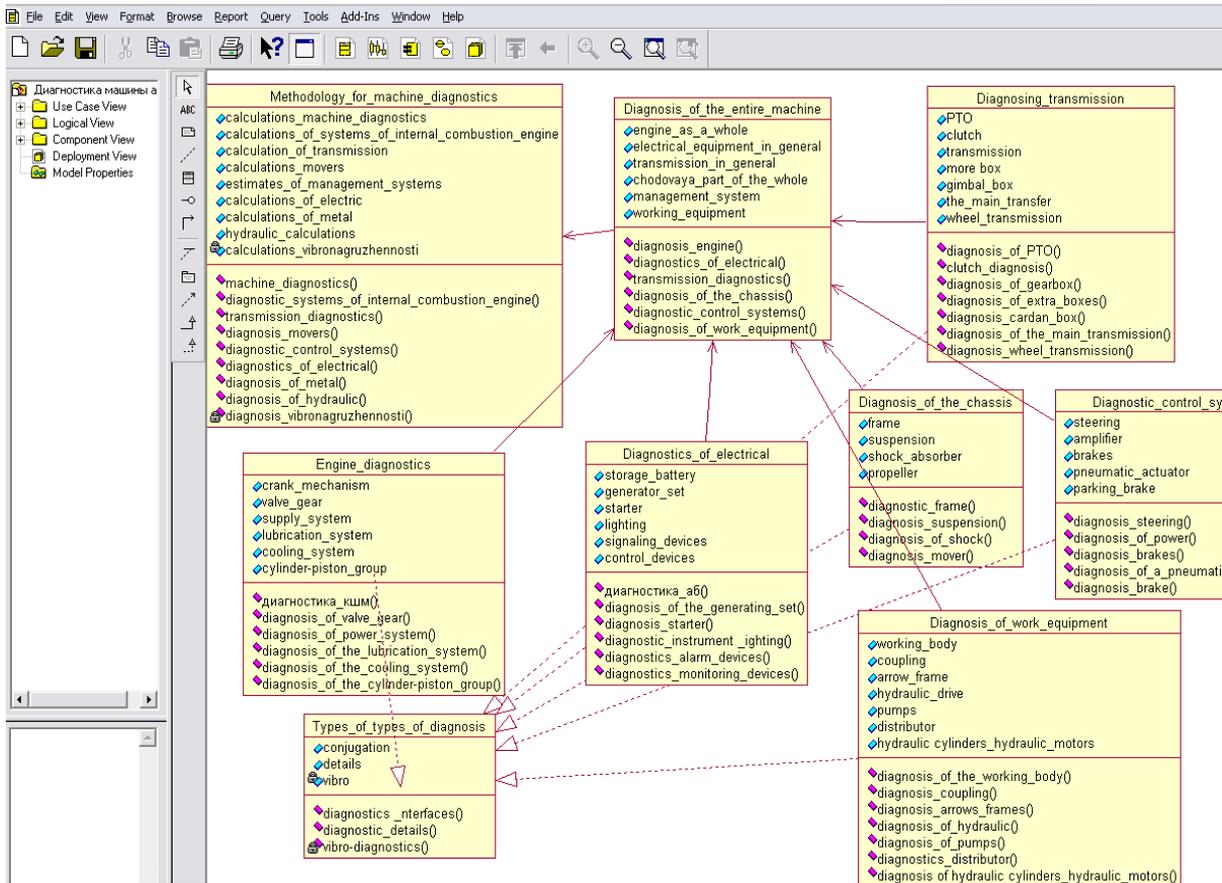
Pic. 7 - The class diagram (Class diagram) showing the problem of diagnosing elements and units of special road cars.

The resulting design automation of diagnostic elements and units of machines will greatly expand the capabilities to meet program objectives.

3 Conclusion

Thus, the proposed research developed methodology for the application of modern information technology IBM Rational Rose Enterprise based on UML (Unified Modeling Language) to reduce the time spent on the design and analysis of special road cars. Obtained example of a new calculation base rotary screw machines.

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