SIMULATION STUDY OF SHIPBUILDING PRODUCTION PROCEDURES AND PROCESSES BY AS SIRIUS 2.0

JOINT STOCK CORPORATION
SHIPBUILDING & SHIPREPAIR
TECHNOLOGY CENTER

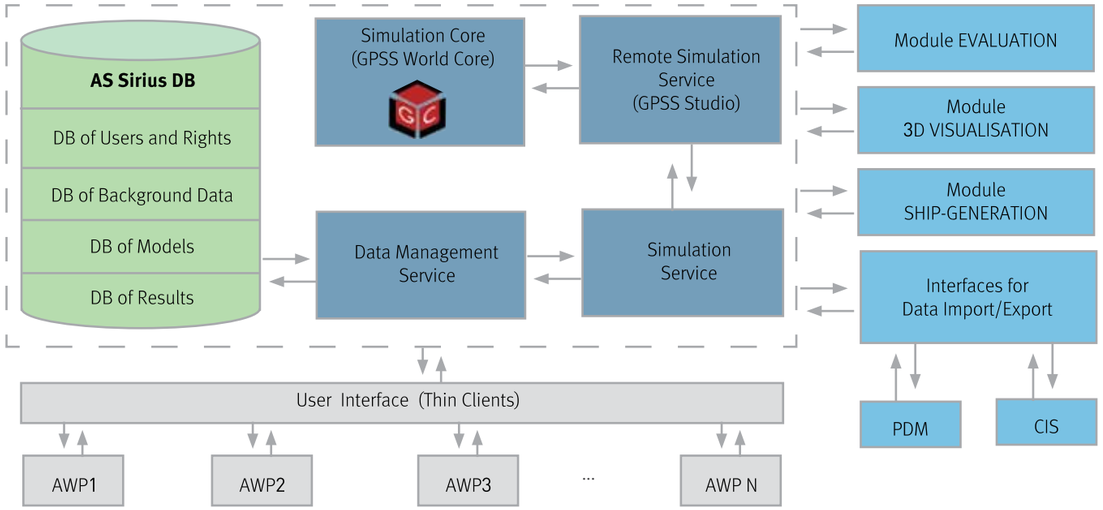
AUTOMATED SYSTEM SIRIUS 2.0

Automated system (AS) Sirius 2.0 is intended for conducting the full cycle of simulation studies for functioning of the main production procedures and processes at shipbuilding enterprises.

AS Siruis 2.0 uses the domestic simulation core GPSS World Core (part of ALINA GPSS software) as its simulation core.

This application runs in Windows OS environment and is based on MS SQL database management system (DBMS).

AS SIRIUS 2.0 (SERVICE COMPONENTS)

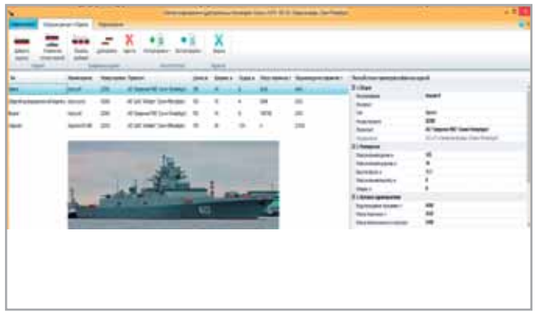


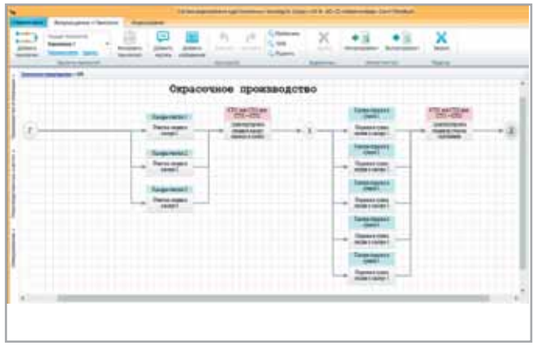
SPECIFIC FEATURES OF AS SIRIUS 2.0:

- Domestic industrial software solution – adapted to peculiar features of domestic shipbuilding procedures and processes, including metal shipbuilding and composite-material shipbuilding
- Invariance of created models for the types and classes of marine equipment and products
- Focus on the end user, without the need to engage a programming engineer – simulation models are generated automatically based on descriptions of production programs, production environment, and procedures and techniques of ship construction (with breakdown to the types of production)
- Possibility of adapting the user interface to customer's requests and requirements
- Availability of built-in tools for developing libraries for typical examples of processing and crane equipment, transportation means, standard procedures for separate types of production, and marine equipment and products
- Local and/or network mode of operation, remote access to simulation models with ensuring the distribution of access rights
- Use of industry-branch norms for labour intensiveness of manufactured products and industry-branch statistic data for products, processes, and shipbuilding production facilities and procedures
- Possibility for background data input and for generation of new models without the simulation core
- Possibility of integration into corporate information systems for quick data import
- 2D visualization of simulation results with interactive elements
- Automatic generation of building berth schedules

FUNCTIONAL CAPABILITIES OF AS SIRIUS 2.0:

- Evaluation of shipyard production program practicability under the given parameters of production system and production procedures
- Determination of duration for the main production stages and its comparison with the scheduled time periods
- Detection of bottlenecks in production systems
- Determination of load rates on production facilities (processing and crane equipment, transportation means, production bays and areas, and building berths)
- Evaluation of effects caused by temporary exclusion from operation of separate components which had been included into the simulation model earlier (equipment/production bay/production type)
- Evaluation of efficiency from putting into operation of separate components which are included into the simulation model anew (equipment/production bay/production type)
- Generation of production schedules for supplies and deliveries (metal-rolled items, pipes, equipment, assembly units and installation units)



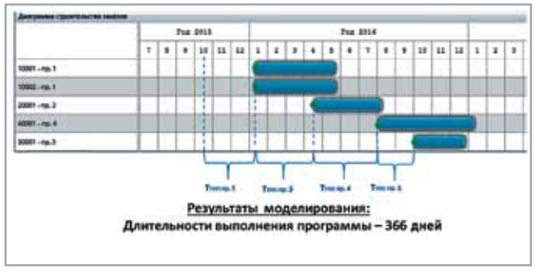


STRATEGIC AND COMPETITIVE ADVANTAGES FROM IMPLEMENTING AS SIRIUS 2.0:

- Increasing the operational efficiency and validity of management decisions which are targeted for optimizing the quality and efficiency rates of production processes
- Simulation of enterprise operation in real-time mode
- Possibility of efficient planning and re-planning of production, synchronization of production plans and schedules of supplies with taking into account the cooperation networks
- Possibility of automatically conducting the simulation examination of projects for reconstruction and modernization of the existing production facilities and for establishing new production facilities
- Possibility of simulating a stage-by-stage modernization and upgrade for enterprise production system

Результаты моделирования:

Длительности выполнения программы – 423 дня. Простой производства – 27 дней

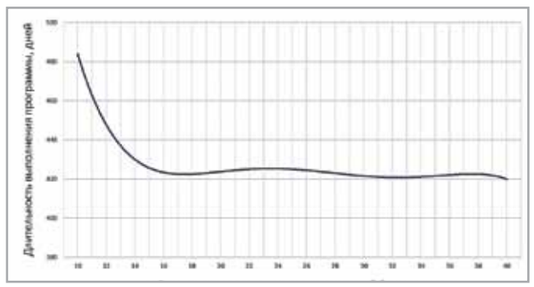


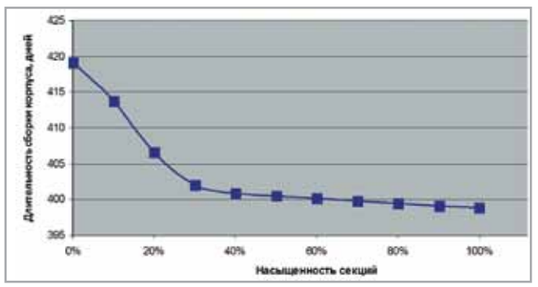
Результаты моделирования:

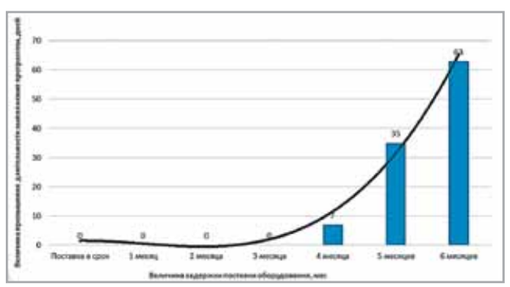
Длительности выполнения программы – 366 дней

Наименование	Длина, м	Используемая длина, м	Коэфф. использования по длине	Общее кол-во заказов находившихся на набережной	Максимальное кол-во заказов одновременно находившихся на набережной
Новая достроечная набережная	546.00	0.00	0.00	0	0
Старая достроечная набережная	590.00	175.00	0.30	5	1

Наименование	Длина, м	Используемая длина, м	Коэфф. использования по длине	Макс. количество одновременно строящихся заказов
Двухпролётный эллинг				
Стапельная нитка 1	286.00	105.00	0.37	1
Стапельная нитка 2	286.00	105.00	0.37	1







AS SIRIUS 2.0, MODULE "SHIP-GENERATION"

Application for automated library-based generation of prototype-ships from a data array which describes how a ship is broken down to the main assembly units (blocks, sections, assembly units) with simultaneous generation of weight-and-dimension properties of the assembly units.

Capabilities of the application:

- Creation of projects with required parameters
- Selection of prototype from library
- Setting the percentage distribution of labour intensity by the types of production
- Setting the percentage distribution of labour intensity by the types of works
- Setting the data about ship order
- Generation of ship breakdown into assembly units (with export of data to Microsoft Excel)

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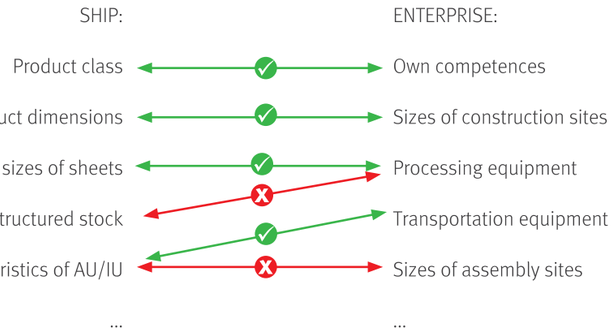
AS SIRIUS 2.0, MODULE "EVALUATION"

Module "Evaluation" is intended for express-evaluation of technological readiness (technological audit) of an enterprise for construction of a ship up to the stage of developing the simulation model.



Functional properties of module "Evaluation":

- Detailed description of ships and enterprises at the level accepted in AS Sirius 2.0 – possibility of data import
- Completion of evaluation when no background information or only partial background information is available
- Displaying the results of brief/detailed express-evaluation of enterprise readiness for construction of a ship
- Automatic generation of a detailed final report with evaluation results in Microsoft Word format

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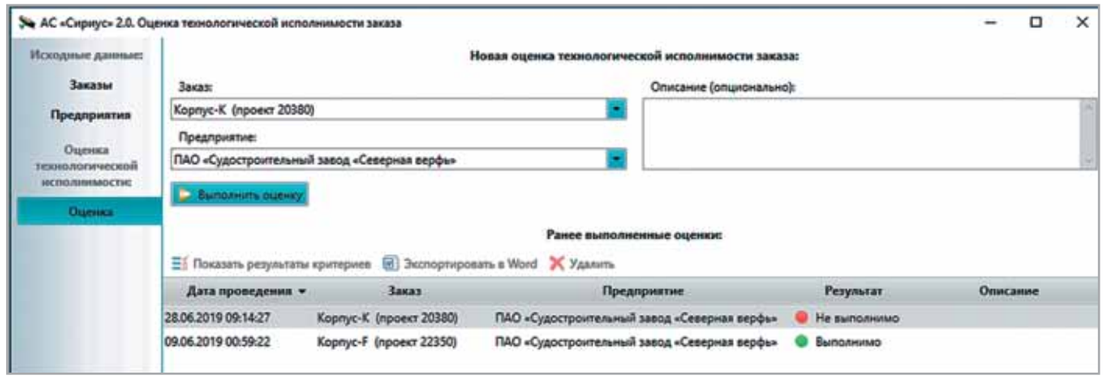

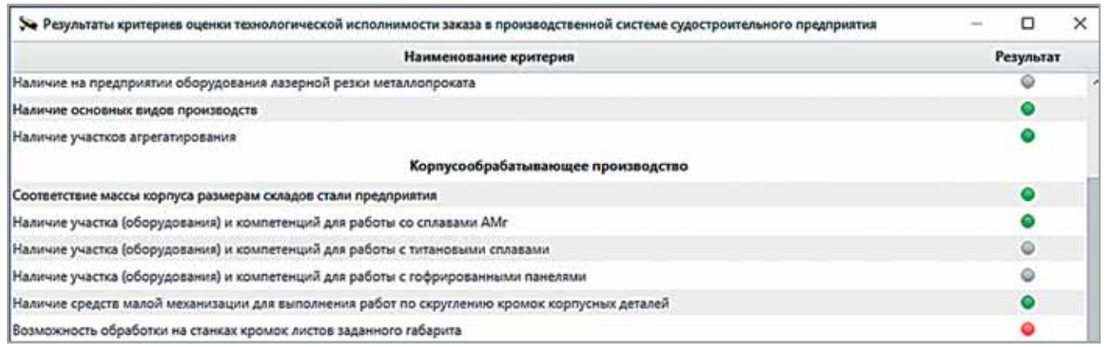

JSC "Shipbuilding & Shiprepair Techology Center"

Evaluation of technological feasibility for construction of ships Project 20380 within the production scheme of Severnaya Verf Shipyard PJSC

Saint Petersburg

2019

4. Shipbuilding enterprise as a whole

There exists a possibility for supplying materials, equipment, and component parts to the enterprise by automobile, railway, river, and sea transport.

The enterprise possesses sufficient competences with regard to construction of ships of this class.

The enterprise possesses sufficient competences with regard to construction of this type of ships for export.

The enterprise possesses sufficient competences with regard to installation, adjustment and commissioning of special systems and weapons systems.

The enterprise has 166 pieces of equipment. Equipment wear is within the accepted norms. Operation characteristics have not been specified for 165 pieces of equipment.

Three-shift works can be arranged as a possible option for both the enterprise as a whole and certain types of production separately.

Available equipment for laser cutting of sheet metal has not been checked, because rolled metal items with thickness less than 10 mm are not available.

An additional advantage of the enterprise is availability of machine-engineering production.

AS SIRIUS 2.0, MODULE "3D VISUALISATION"

Application for automatic generation of 3D visualisation based on simulation modelling results with parallel issue of analytical data (statistics) for ships under construction, equipment, accessories, and resources used.

Functional properties of module "3D Visualisation":

- Generation of visualisation based on libraries of 3D models, primitives, and objects
- Free travel within the virtual production model, control over visibility of objects, tracking of travel of separate assembly units
- Displaying the statistics of ships for the required date within the time limits of production program realization
- Use of BIM modules for increasing the detail and layout of 3D visualisation

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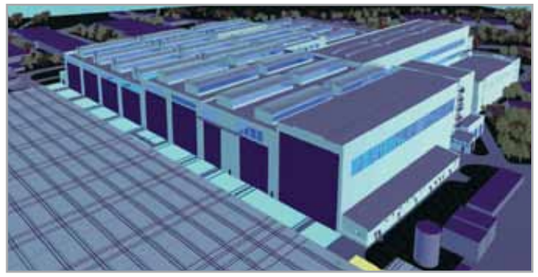

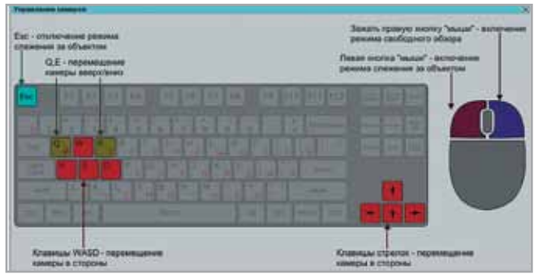

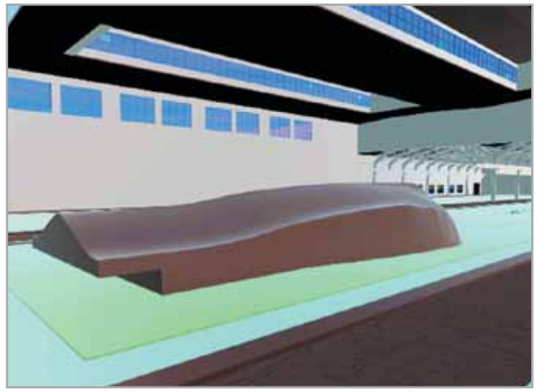

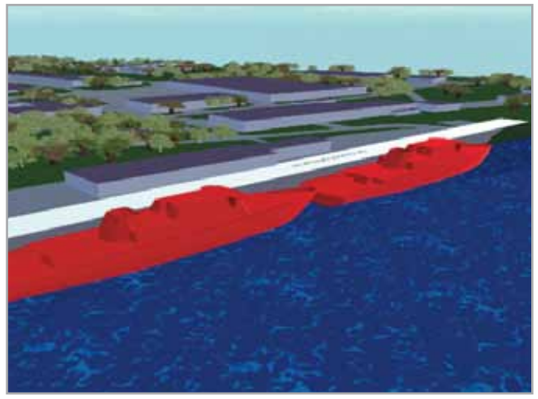

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