



JSC NIZHNY NOVGOROD ENGINEERING COMPANY ATOMENERGOPROEKT
(JSC NIAEP)

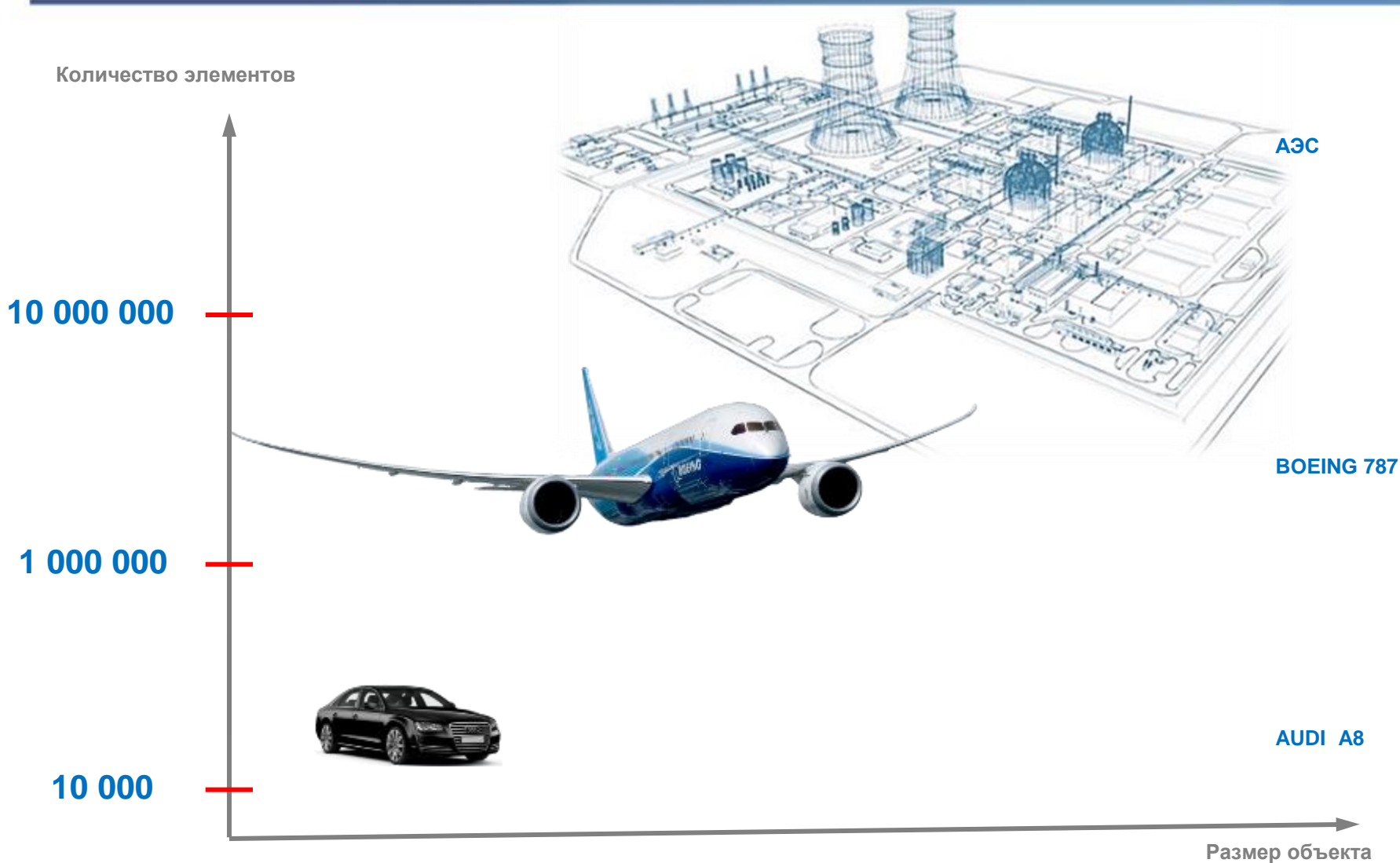
ГОСУДАРСТВЕННАЯ КОРПОРАЦИЯ ПО АТОМНОЙ ЭНЕРГИИ «РОСАТОМ»

Multi-D design – a technology of complex engineering projects life cycle management

V.V. Alenkov

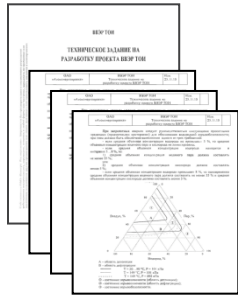
Chief Architect of united information space

Engineering structures scale



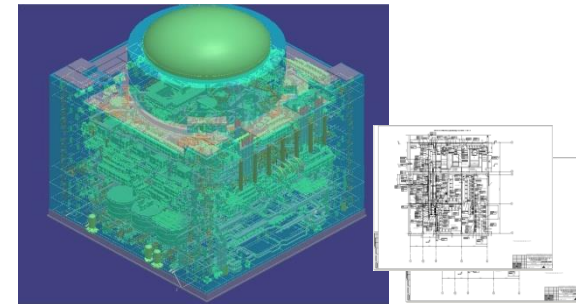


Technical requirements Typical design



Shall comply

Design and as-built model (3D|2D)



Shall comply

Physical facility configuration

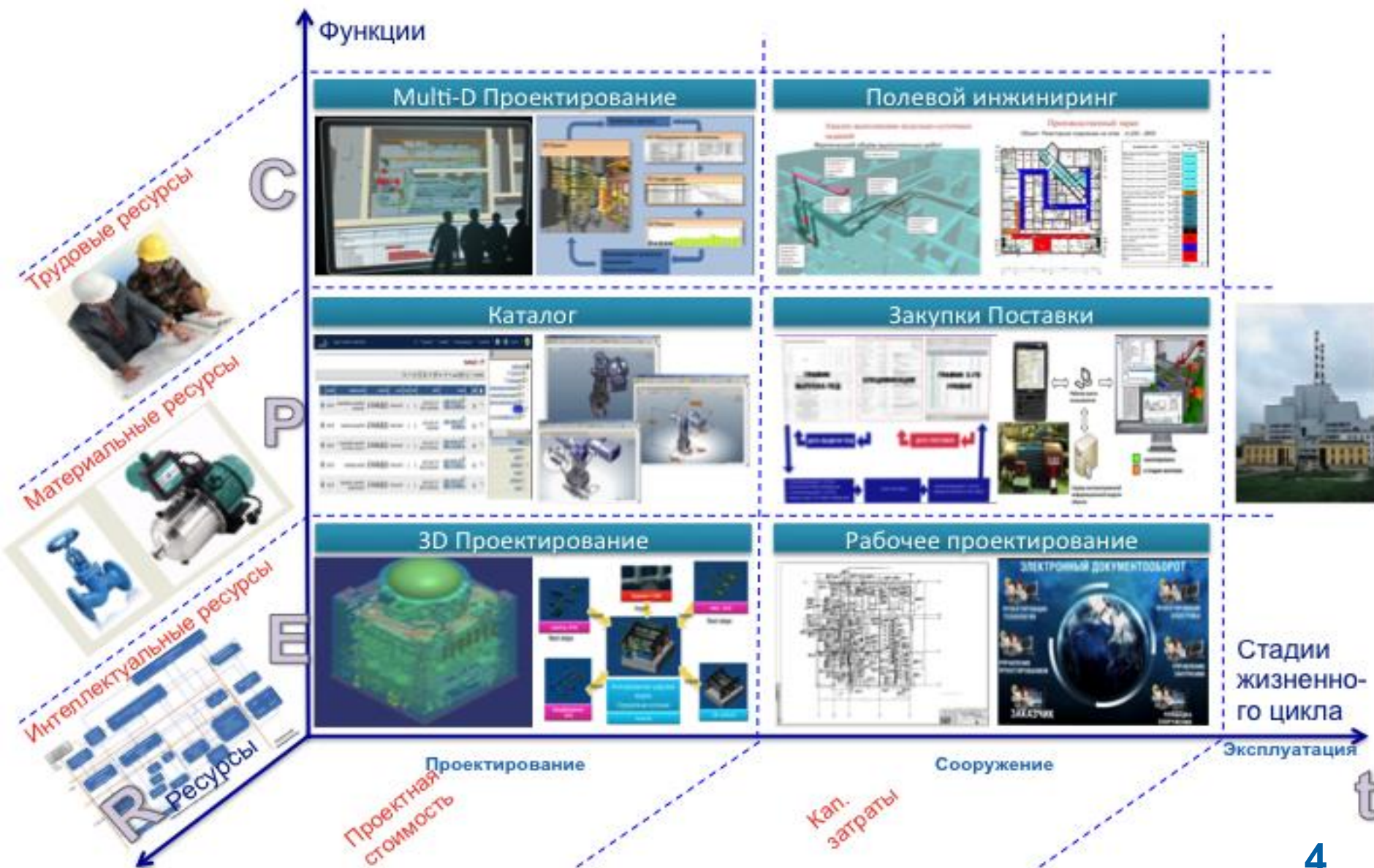


Shall comply

Согласно IAEA-TECDOC-1335 функция управления конфигурацией должна обеспечивать что:

- Элементы конфигурации соответствуют друг другу на протяжении всего ЖЦ
- Все изменения авторизованы
- Соответствие верифицируемо

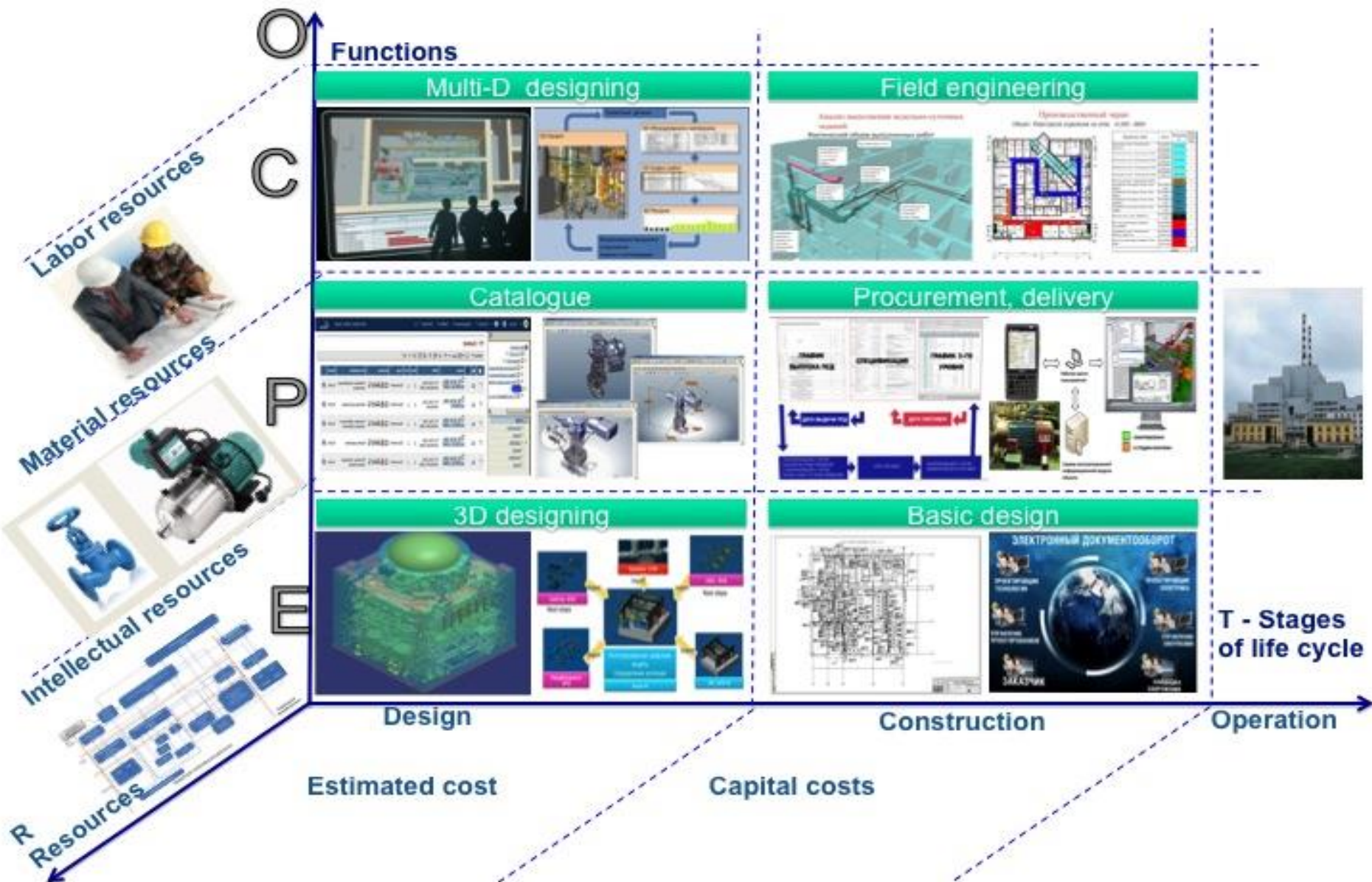
Complex engineering projects life cycle management technologies



Technologies of lifecycle management



POCATOM

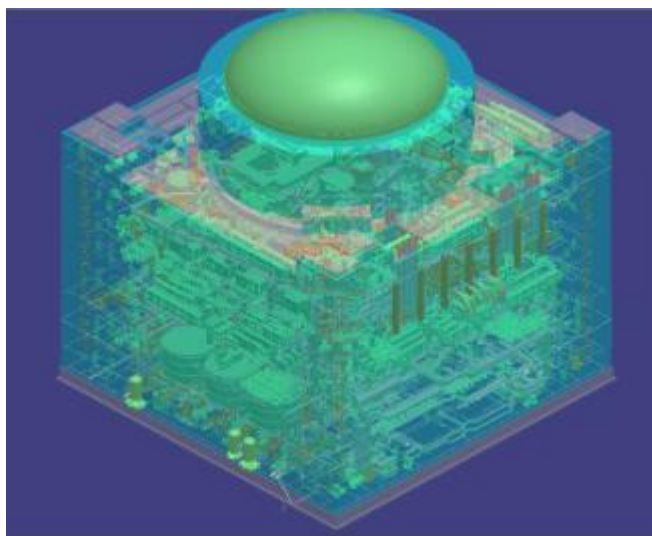


Integrated design on the basis of SP Enterprise

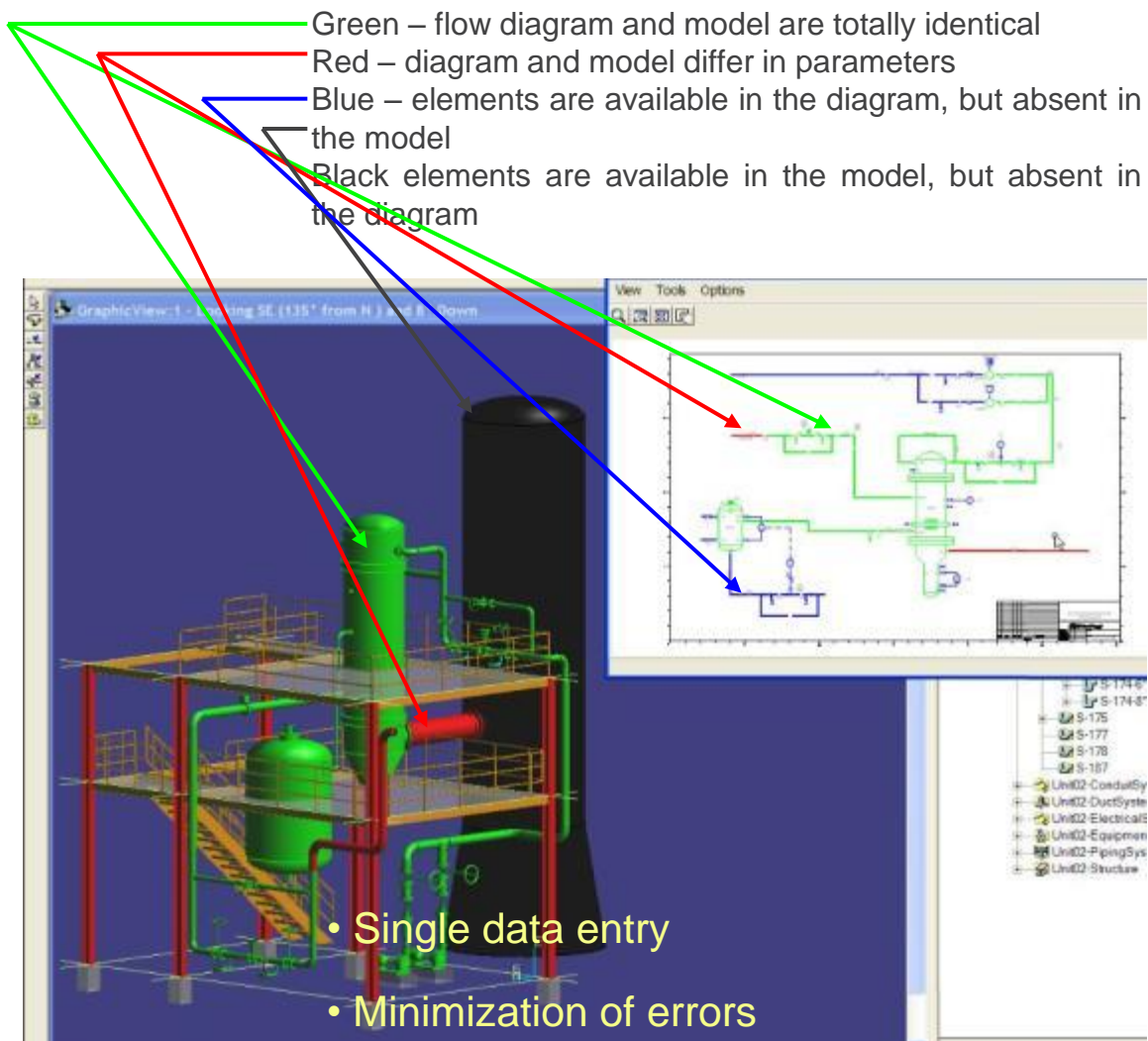


POCATOM

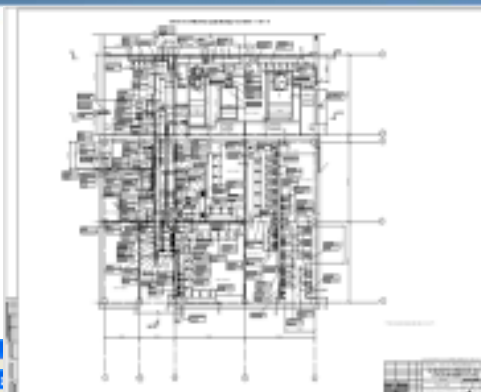
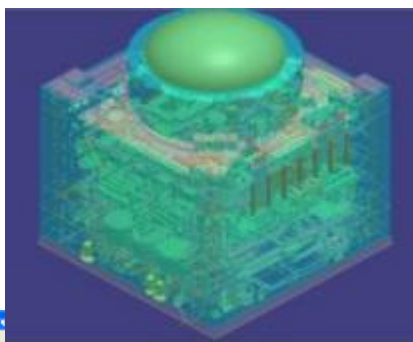
When developing the model based on SP 3D, it is possible to publish process flow diagram from SP P&ID in SPF



A 3D model with high detailization is created. Arrangement solutions and process flow diagrams are fully interconnected.



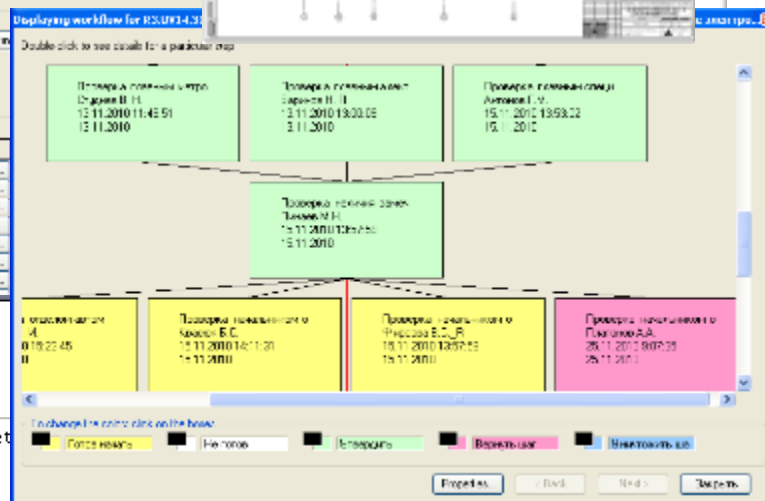
Technical electronic document management Generation of detailed design documents



Workflow for RS-014-3

Double-click to see details for a particular step

Name	Description	Step/Version	Location	Properties	Checked	Completed	Accept Step
Проверка проекта	Проверка проекта	1.0	1.0	1.0			Согласование 1-го
Согласование 1-го	Согласование 1-го	1.0	1.0	1.0			Согласование 2-го
Согласование 2-го	Согласование 2-го	1.0	1.0	1.0			Согласование 3-го
Согласование 3-го	Согласование 3-го	1.0	1.0	1.0			Согласование 4-го
Согласование 4-го	Согласование 4-го	1.0	1.0	1.0			Согласование 5-го
Согласование 5-го	Согласование 5-го	1.0	1.0	1.0			Согласование 6-го
Согласование 6-го	Согласование 6-го	1.0	1.0	1.0			Согласование 7-го
Согласование 7-го	Согласование 7-го	1.0	1.0	1.0			Согласование 8-го
Согласование 8-го	Согласование 8-го	1.0	1.0	1.0			Согласование 9-го
Согласование 9-го	Согласование 9-го	1.0	1.0	1.0			Согласование 10-го



От Вас ожидается действие в SPF.

SmartPlantFoundation@Intergraph.com

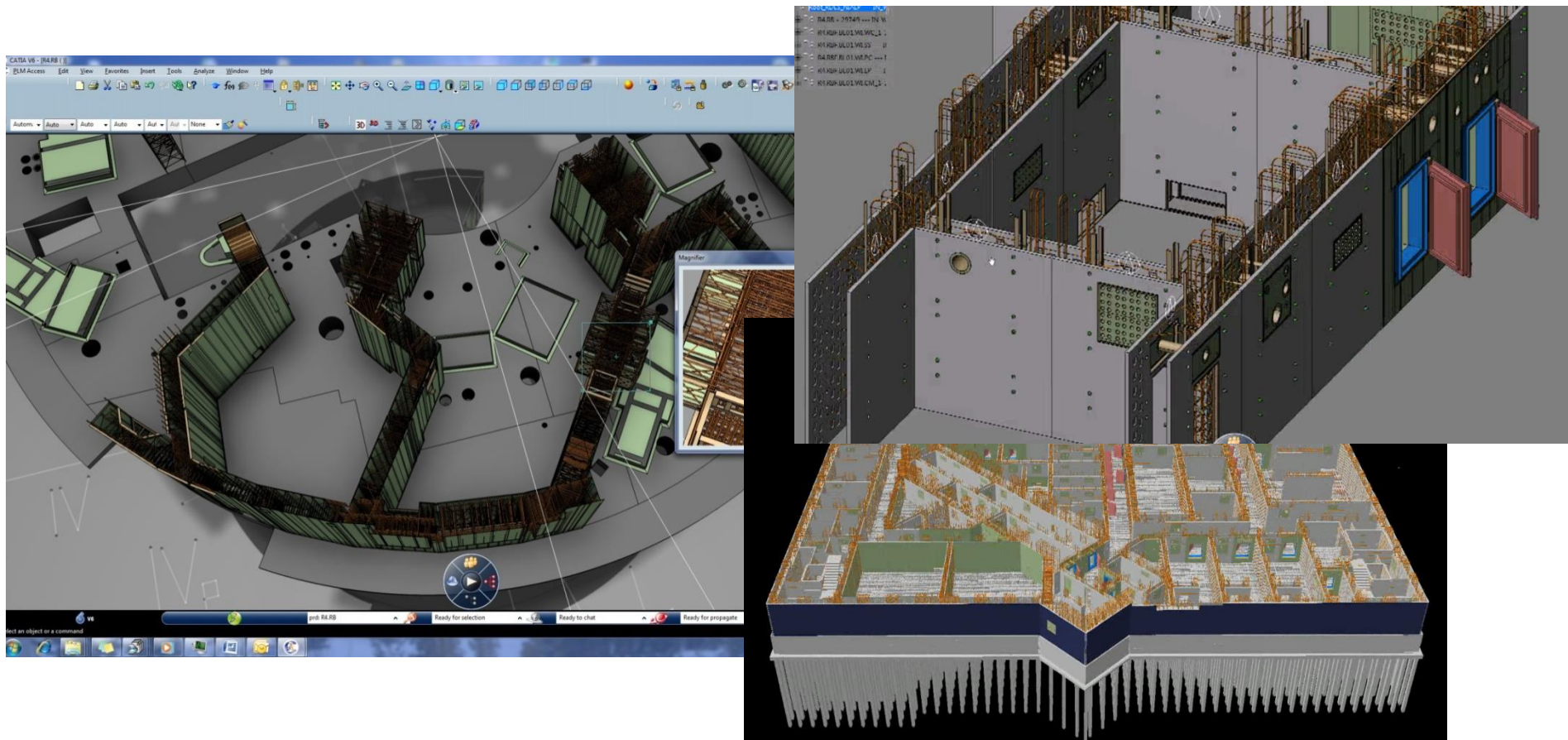
Кому: Титов А.А.

R3.TG11.3001.011.00.00.001 документ требующий согласования. (Target)

Сообщение на следующий шаг

All approval and receipt of comments from the Customer are done in electronic format.
Detailed design documents are issued directly from 3D model.

Civil engineering 3D design in Catia

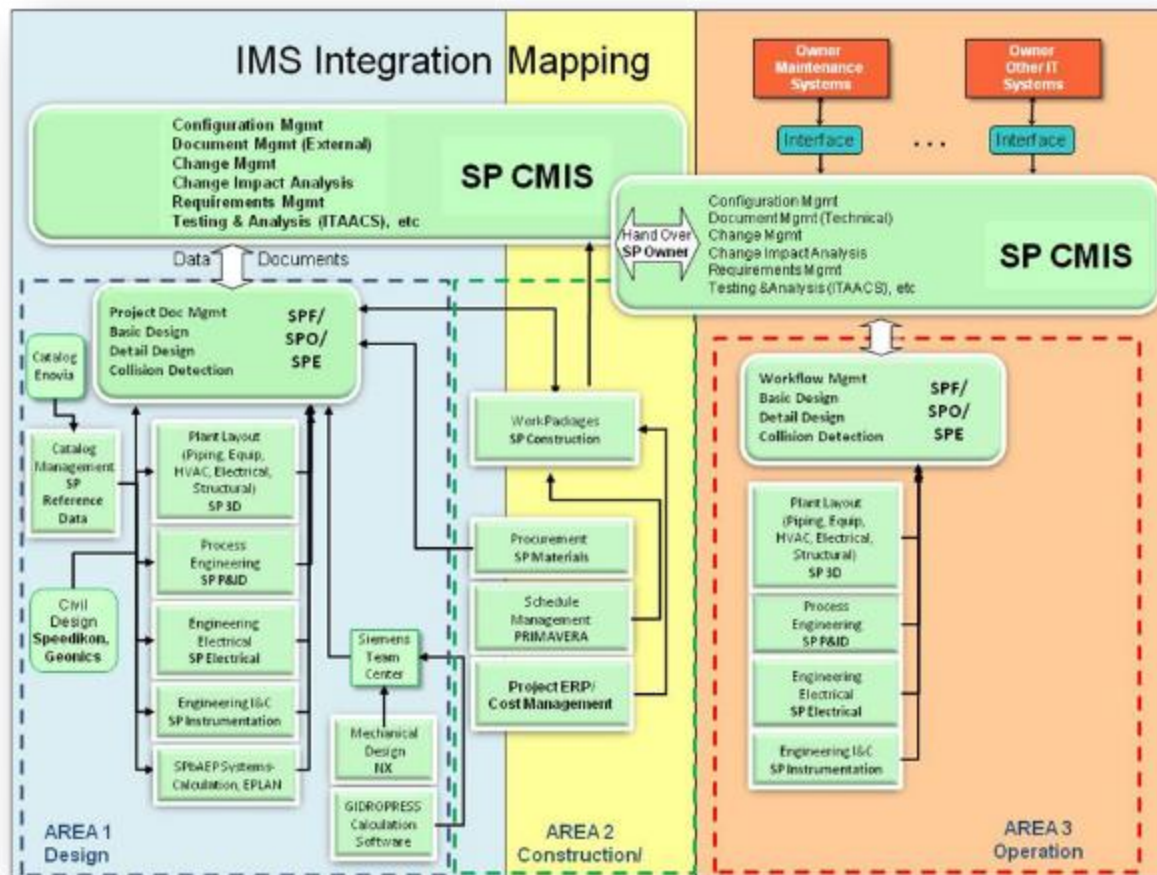


Civil engineering 3D model with structural accuracy has been developed.

Calibration of all necessary construction physical volumes.

Assembly modeling for modular structures.

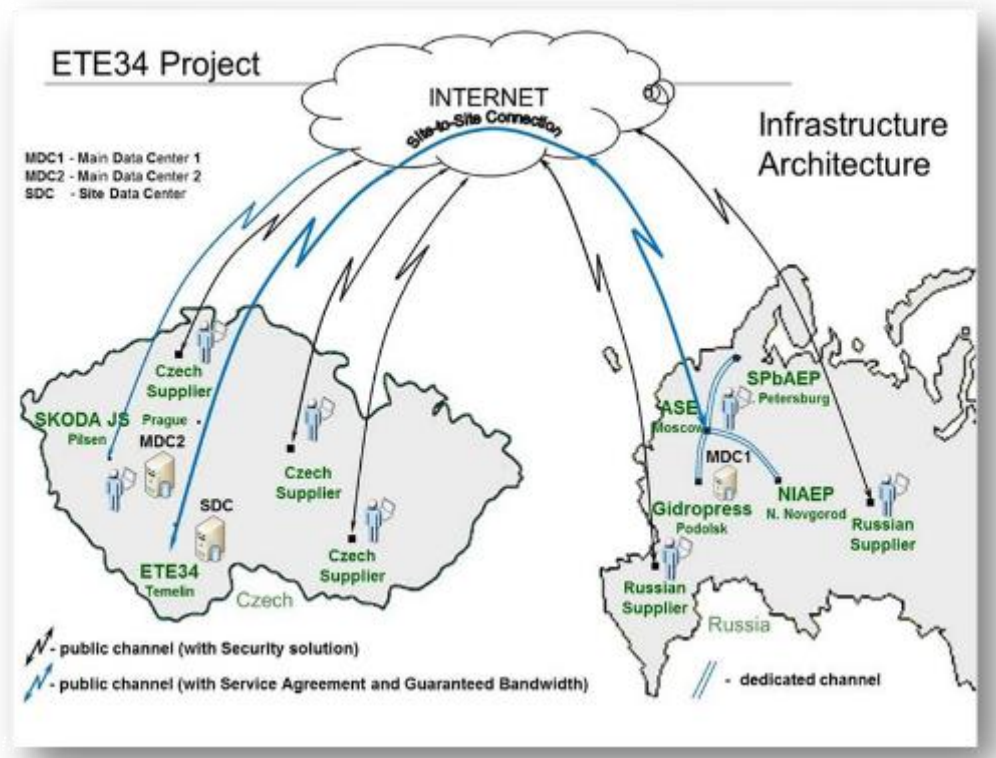
IMS Temelin architecture



Replication of United Information Space for the project of NPP Temelin completion with the use of a new solution by Intergraph is SmartPlant CMIS system.

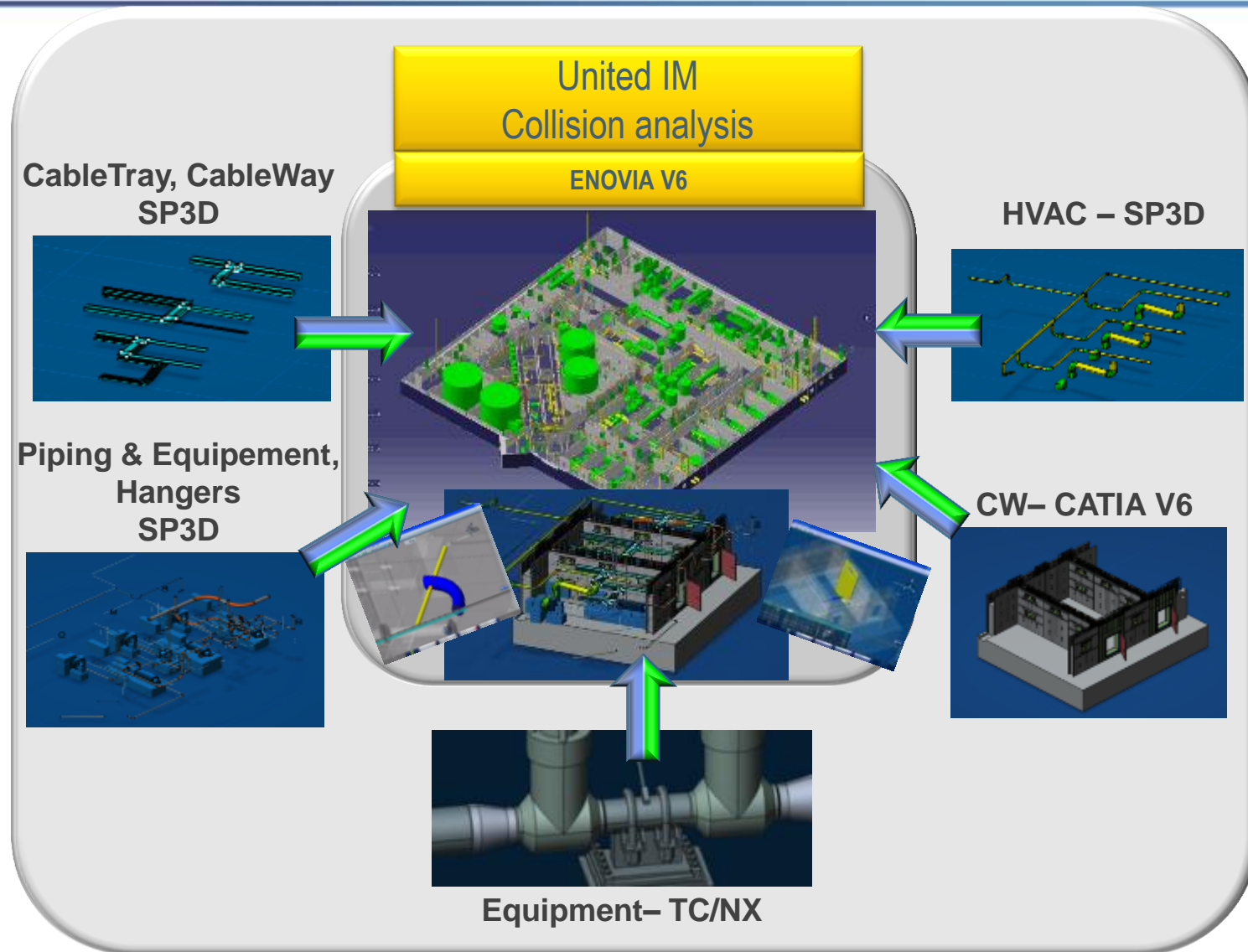
SmartPlant CMIS is developed on the basis of the best global practice and provides the Customer with access to the project information in a single source over the whole Project life cycle.

Distributed solution

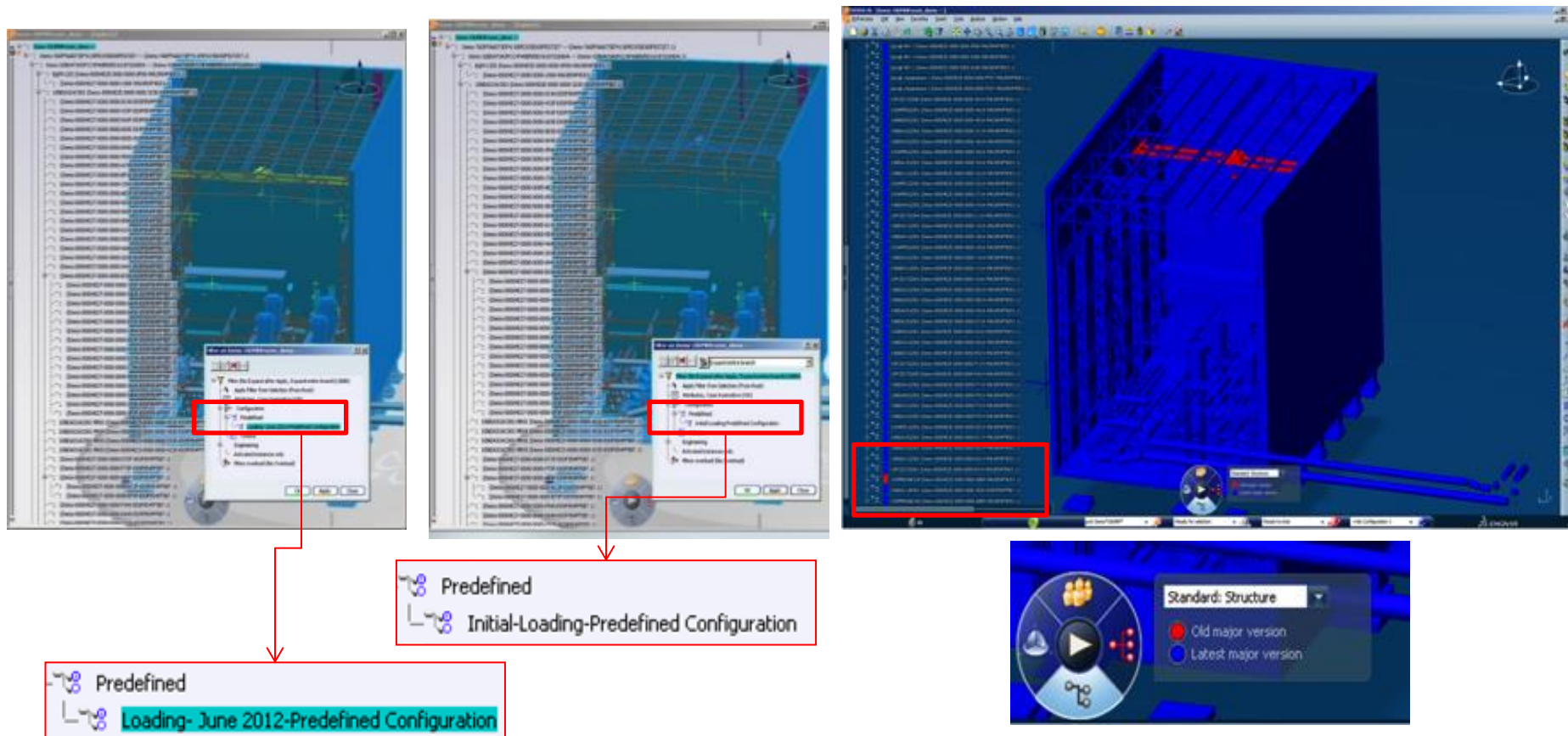


Distributed solution using the means of protection enables the experts to work efficiently at their workplaces, while having access to relevant data and to the united information model.

Creation of the united information model

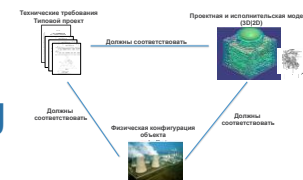


The tool of power unit change and configuration management on the basis of the united model.



Configuration and change management is carried out on the basis of a project information model.

It is possible to compare various configuration versions of the projects being implemented, made on the basis of a common project.



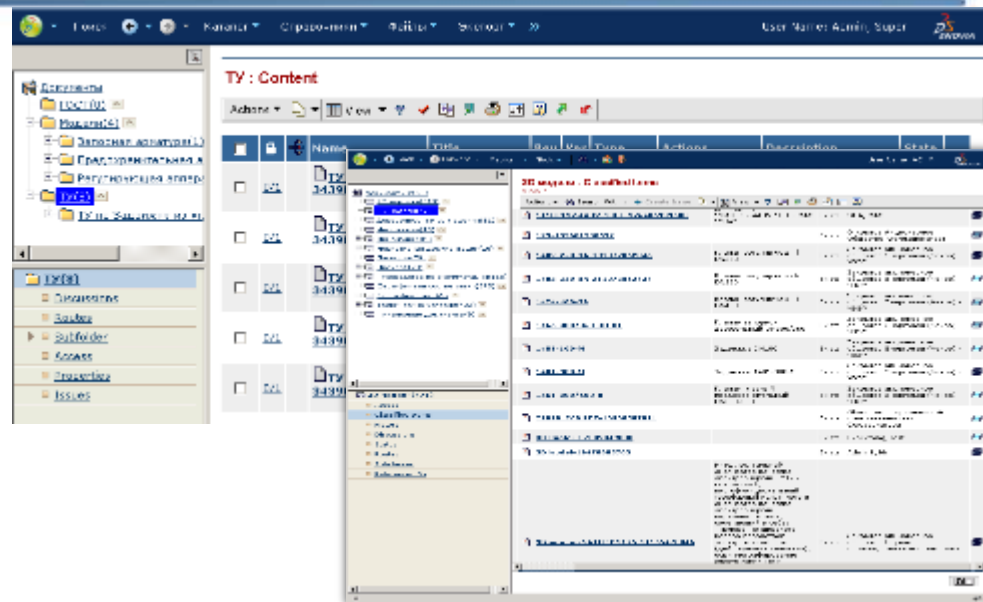
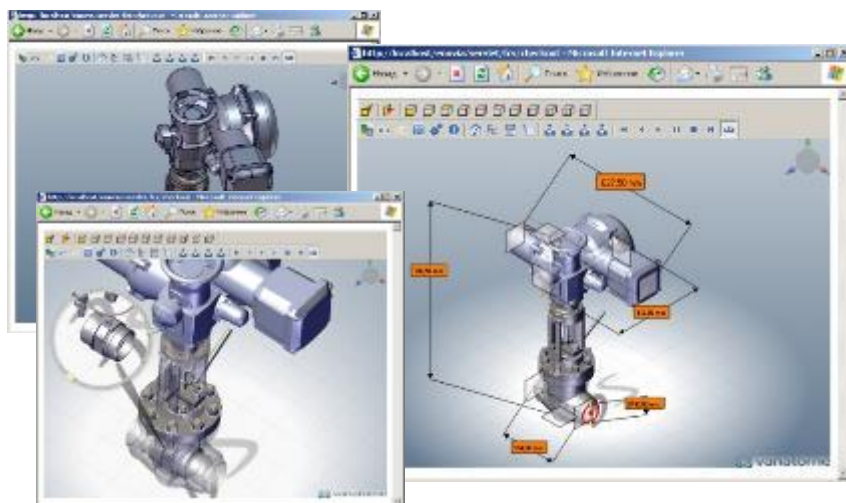


Catalogue of equipment and materials

Centralized storage

Information (online access)

Document hierarchy for engineering systems, classes, equipment, etc.



Complete information contained in the equipment card:

- Technical specifications
- Information about the manufacturer
- Regulatory documents
- Equipment 3D model



The catalogue contains a product assortment of 34 Czech companies (about 15 thousand units).

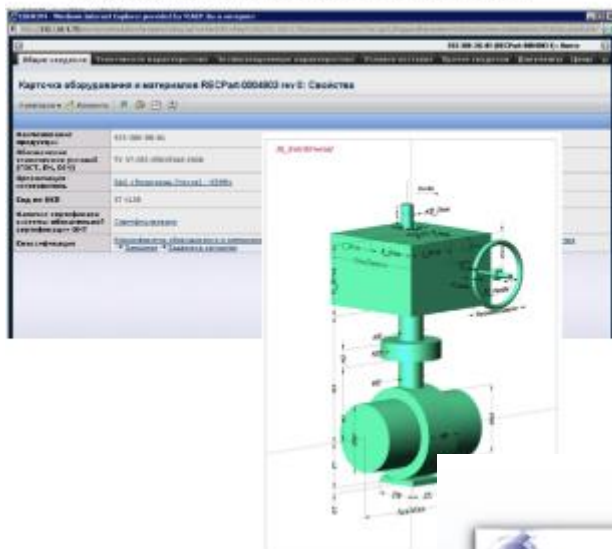
The catalogue is continuously being filled with the information on the manufactured products.



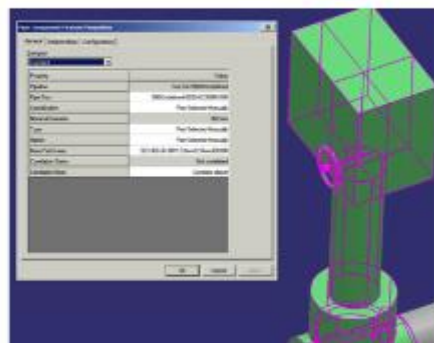


Integration with design systems

Задвижка запорная 933-300-ЭБ-01 в ЕО НКМ



Задвижка запорная 933-300-ЭБ-01 в SP3D



Адаптер

- Атрибутивная информация;
- Ссылки на .ant файл

- .ant файл

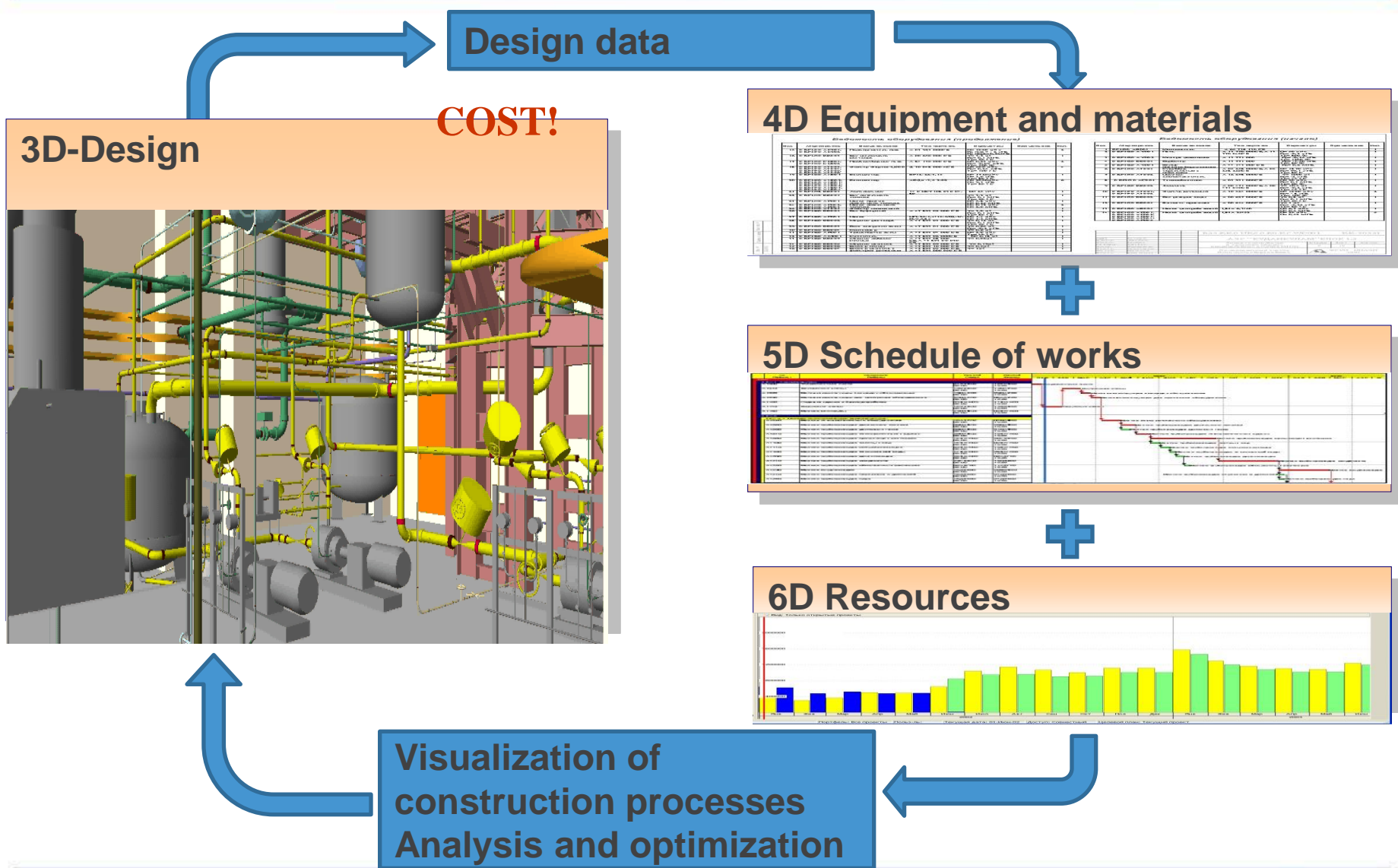


The information is stored in the catalogue in a neutral format and may be used in any design system.

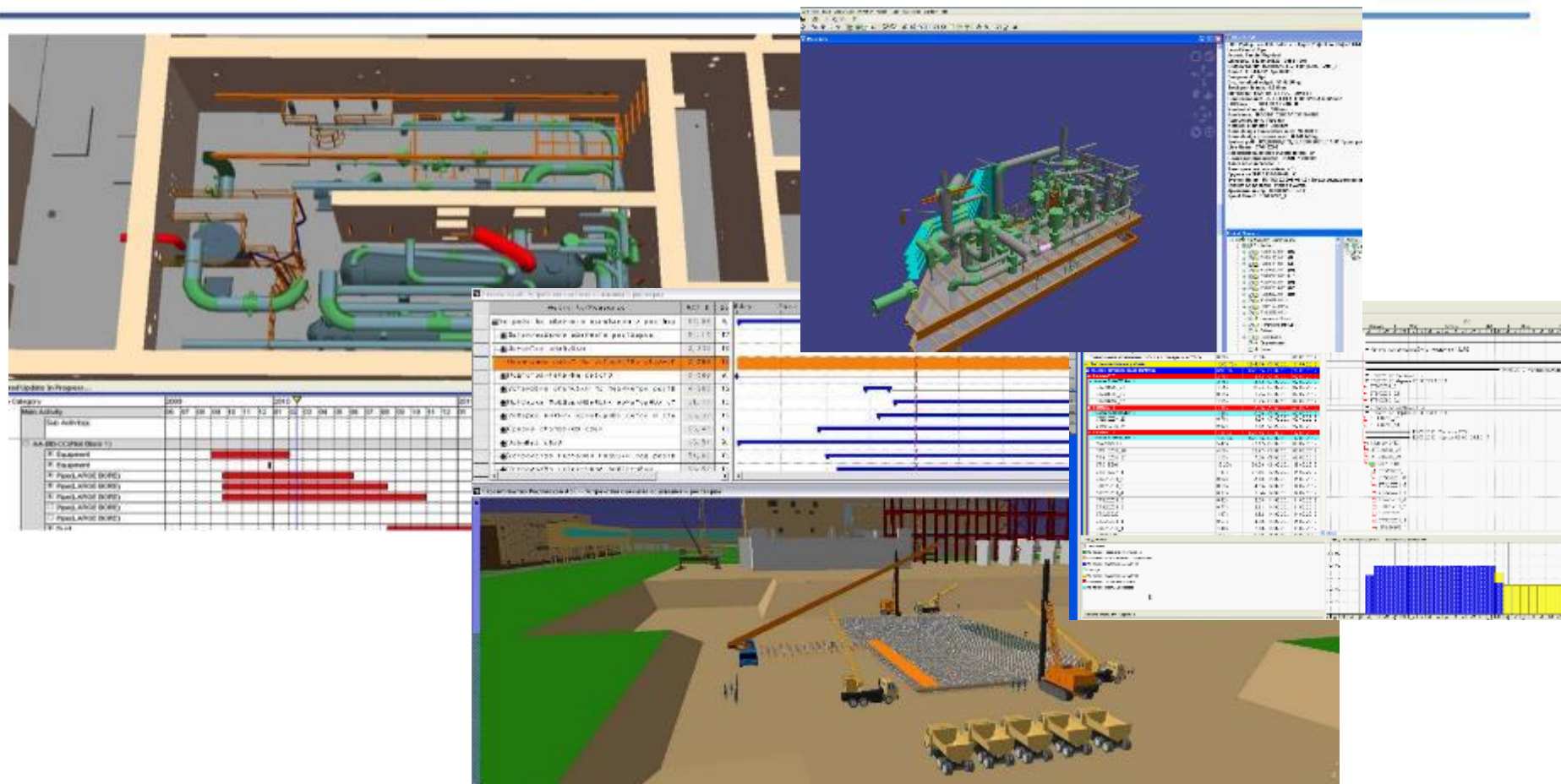
The catalogue contains information essential at all project life cycle stages, including operation.

Multi-D designing cycle.

Modeling of construction process



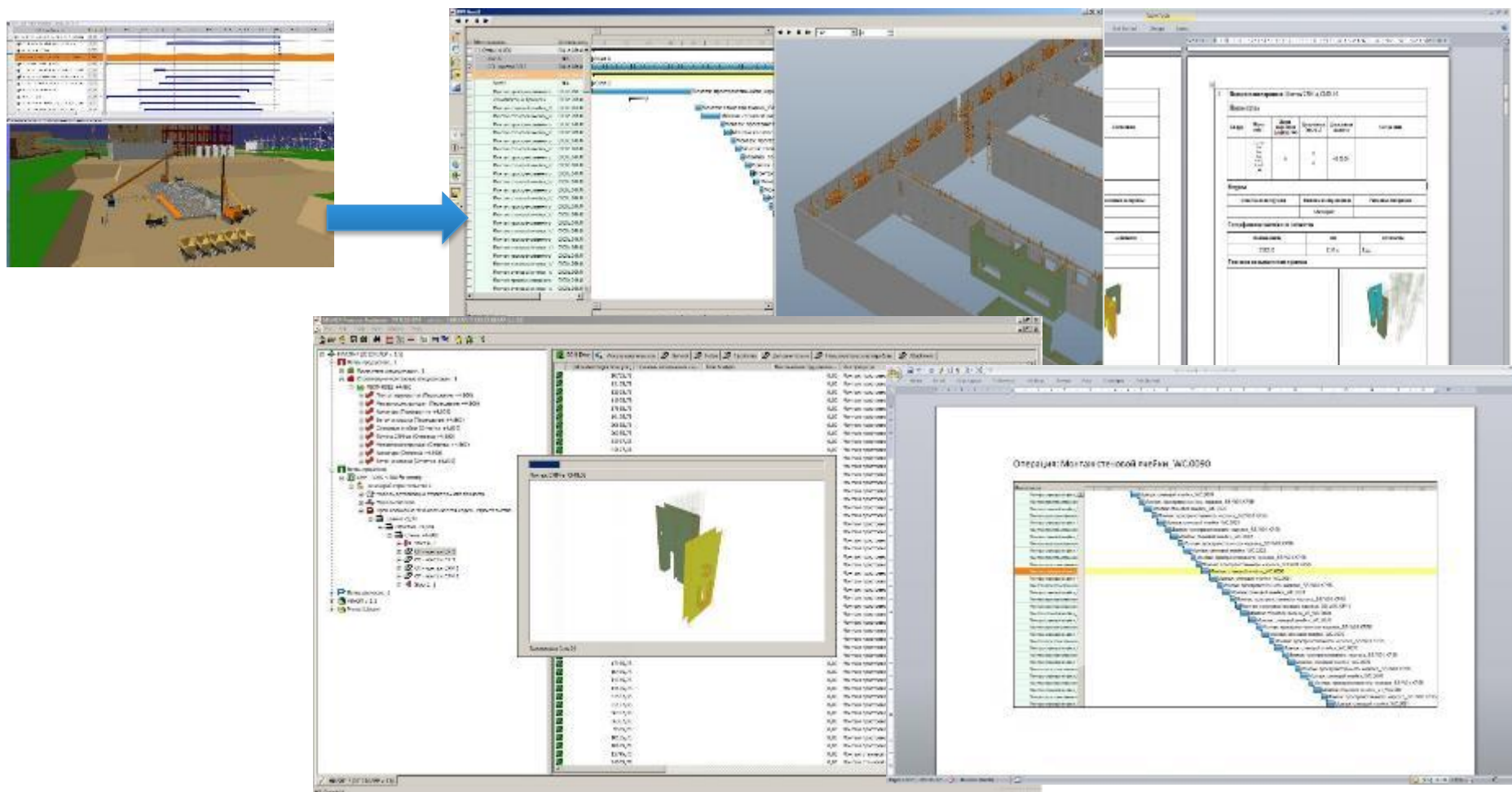
Construction modeling



On the basis of the united information model, construction processes (process and construction ones) are fine-tuned prior to their performance at site.

It allows to define the optimal technology and create a “real” construction schedule.

Generation of work execution plans (WEP) and detailed schedules on the basis of Multi-D Design



On the basis of Multi-D design, work execution plans are generated and weekly-daily tasks for contracting agencies are formed.

Equipment identification



Bar-coding at the Supplier's at the moment of contract signing



SPMAT Site

- Регистрация факта физического поступления оборудования на склад с использованием технологий автоматизированной идентификации



The screenshot shows the SPMAT Site software interface, displaying a table of equipment data. The table includes columns for equipment name, quantity, and other details. The data is organized into a grid with yellow and blue headers.

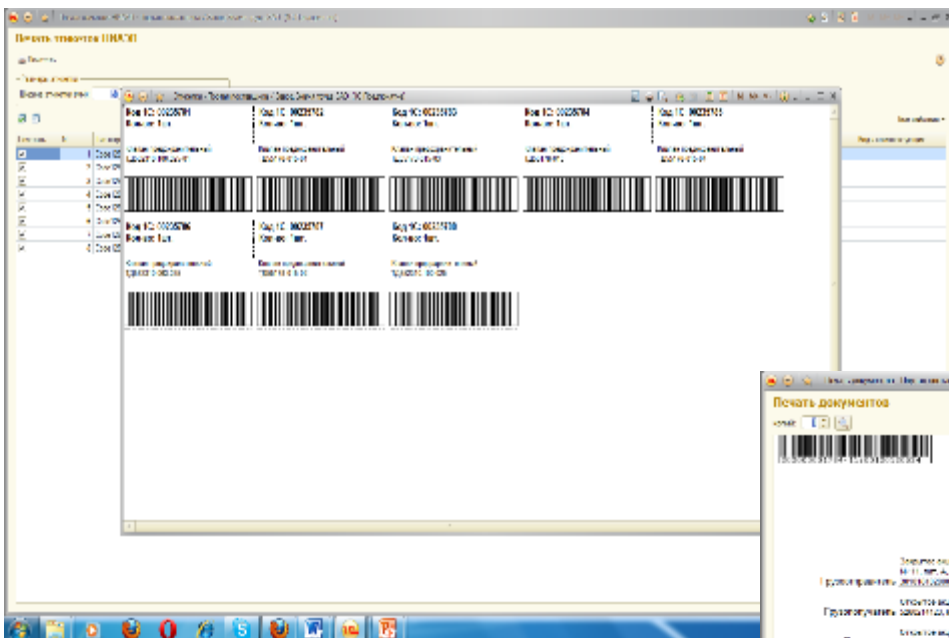
Оборудование	Количество	Склад	Статус	Датум	Пользователь
Агрегат насосный	1	Склад	Активен	2010-10-10	Администратор
Агрегат насосный	1	Склад	Активен	2010-10-10	Администратор
Агрегат насосный	1	Склад	Активен	2010-10-10	Администратор
Агрегат насосный	1	Склад	Активен	2010-10-10	Администратор
Агрегат насосный	1	Склад	Активен	2010-10-10	Администратор
Агрегат насосный	1	Склад	Активен	2010-10-10	Администратор
Агрегат насосный	1	Склад	Активен	2010-10-10	Администратор
Агрегат насосный	1	Склад	Активен	2010-10-10	Администратор
Агрегат насосный	1	Склад	Активен	2010-10-10	Администратор
Агрегат насосный	1	Склад	Активен	2010-10-10	Администратор

Supplier's portal

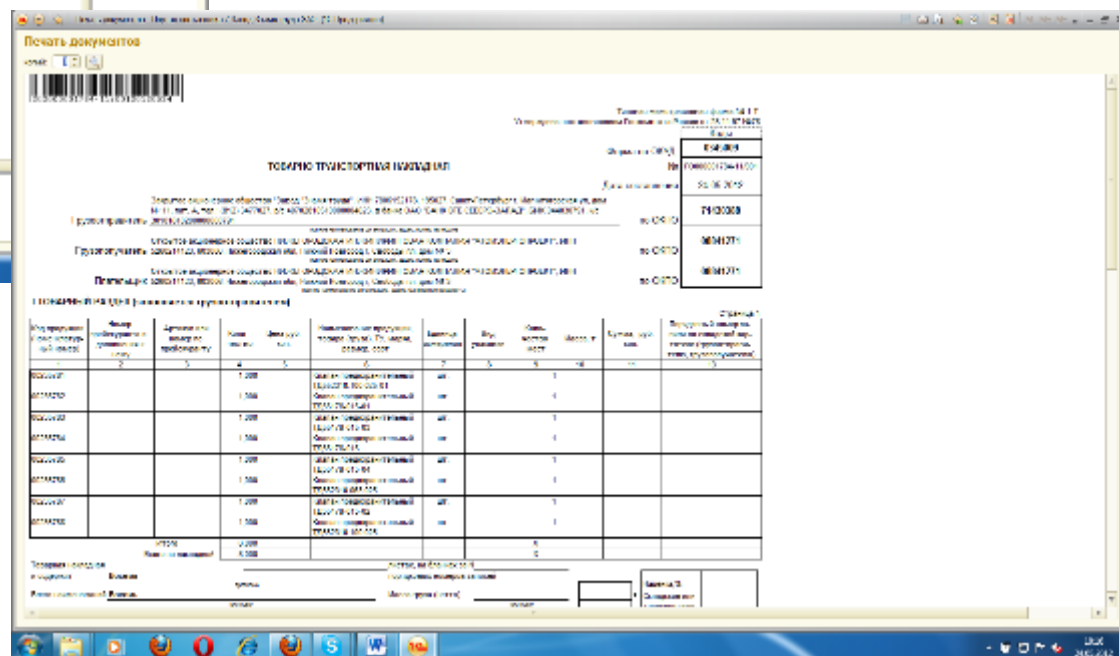


Supplier's portal is a Supplier's interaction management system within the frame of performing supply contracts for NPPs under construction.

- Contract specifications
- Supporting documentation
- Printing of bar-code labels



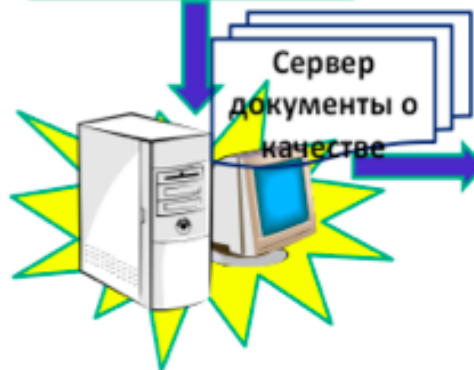
- Initial documents generation
- Direct link with accounting systems
- Control of naming





ПОСТАВЩИК,
ОТГРУЗКА
ОБОРУДОВАНИЯ,
ЗАГРУЗКА ЭЛЕКТРОННЫХ
КОПИЙ ДОКУМЕНТОВ О
КАЧЕСТВЕ

склад



Сервер
документы о
качестве

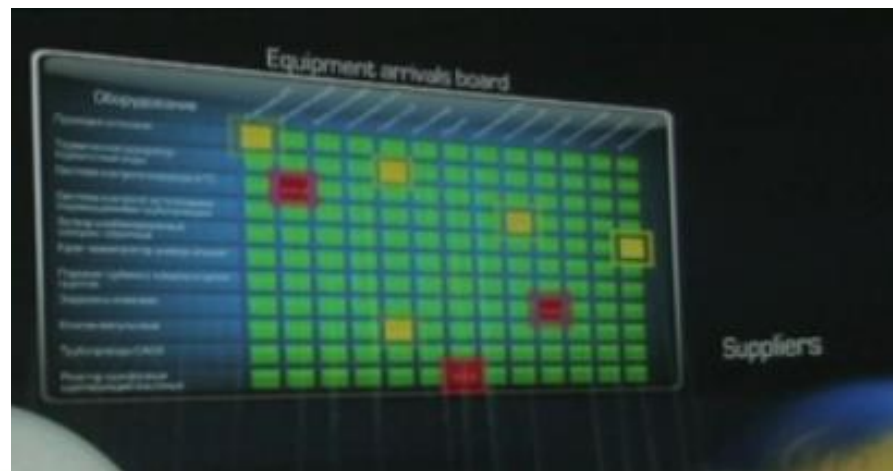
ПРЕДВАРИТЕЛЬНЫЙ
ВХОДНОЙ
КОНТРОЛЬ
ДОКУМЕНТОВ ПО
ЭЛЕКТРОННЫМ

УСТРАНЕНИЕ
ВОЗМОЖНЫХ
НЕСООТВЕТСТ
ВИЙ

- Significant acceleration of incoming inspection procedures
- Improvement of as-built documents quality

Equipment arrival board.

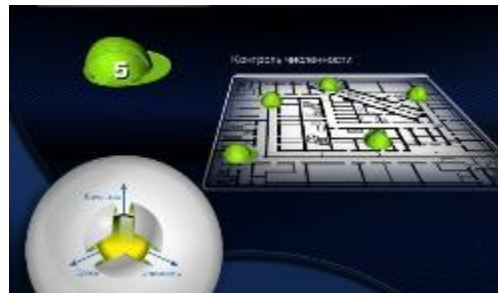
- Information about equipment delivery status online (at construction site)
- Declarative filling by suppliers



Field engineering at construction site. Construction management on the basis of Multi-D design.



Visual modeling studio. Information booths. Weekly-daily tasks with 3D. Production screens. Control of human resources.

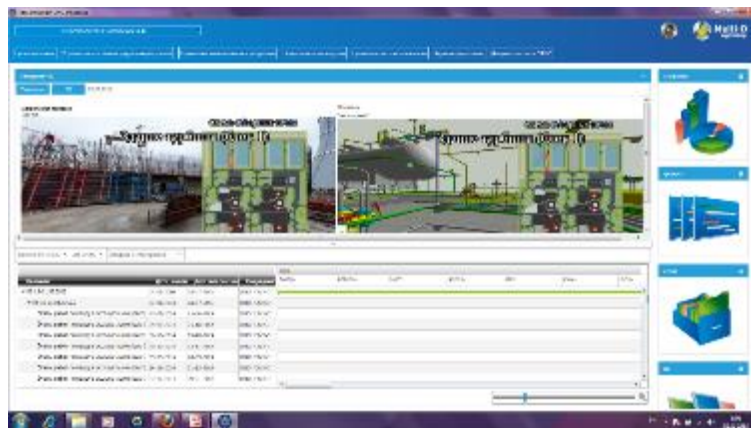


Производственный экран

Объект: Реакторное отделение №4, 200, 3600



Координаты	Работы	Сметы	Организация	План. числен.
Облицовка пола. Помещение №4021/1, 2	Р3.00098.3 0.283 м. 2	РОССЭМ	20	
Облицовка пола. Помещение №4027	Р3.00098.3 0.283 м. 2	РОССЭМ	40	
Облицовка пола. Помещение №4024	Р3.00098.3 0.283 м. 2	РОССЭМ	20	
Обрешетка пола. Помещение №4025	Р3.00098.3 0.283 м. 2	РОССЭМ	40	
Облицовка пола. Помещение №4032	Р3.00098.3 0.283 м. 2	РОССЭМ	10	
М/швод. формы. Помещение №0168	0	СЗСМ	60	
Устройство стяжки. Пом. №4014	Р3.01801.3 0.283	СМУ-12	20	
Устройство стяжки. Пом. №4053	Р3.01801.3 0.283	СМУ-12	20	
Устройство стяжки. Пом. №4054/1	Р3.01801.3 0.283	СМУ-12	20	
Устройство стяжки. Пом. №4060	Р3.01801.3 0.283	СМУ-12	20	
Монтаж м/к. Пом. №4004/1, 2	Р3.01249.5 0.283	ЮГЭЛЕКТРО	80	
М/швод. прокладку. Пом. №4052	Р3.02589.3 0.363 м. 2	СЗСМ	50	
Шлифовка пола. Помещение №4031/2, 3	Р3.00097.3 0.283 м. 1	РОССЭМ	60	
М/швод. прокладку. Пом. №4068	Р3.02589.3 0.363 м. 2	СЗСМ	50	
ИТОГО			570	





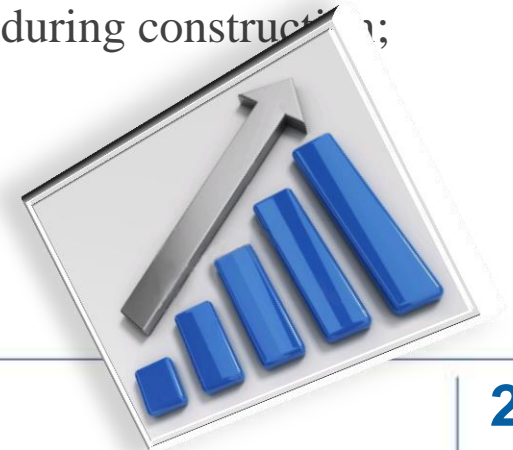
Strategic objective:

Improvement of NPP construction management system efficiency by applying advanced information technologies:

- quality improvement,
- cost reduction,
- acceleration of NPP construction.

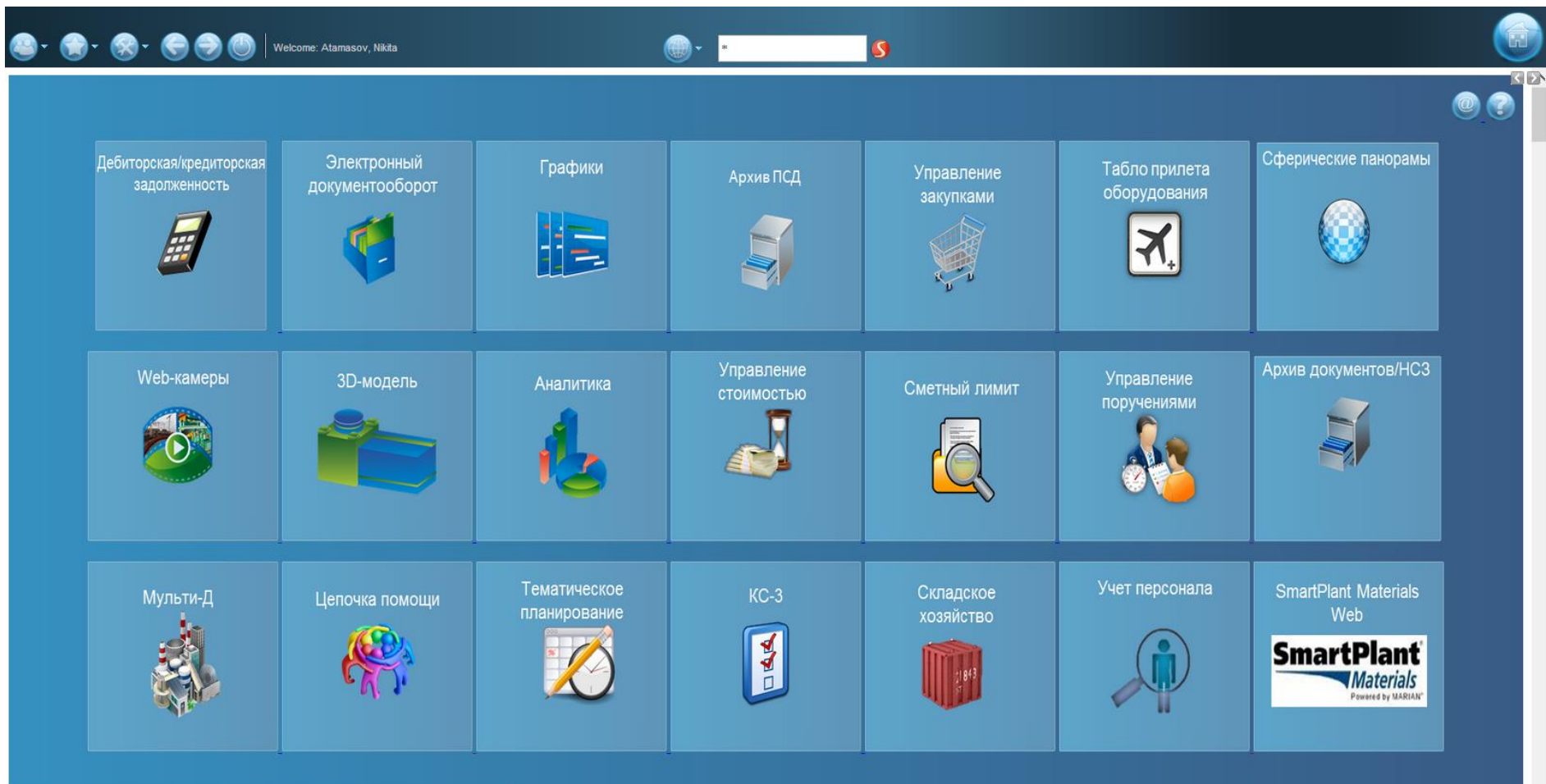
The primary function of the system is IT-support of:

- NPP construction process monitoring by analyzing analytical indices of activity of organizations taking part in NPP construction project;
- decision-making by the management and head quarters during construction;
- operational management.



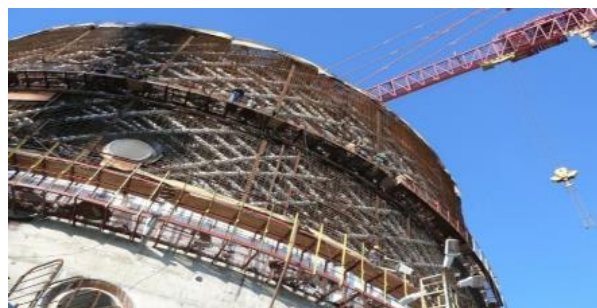
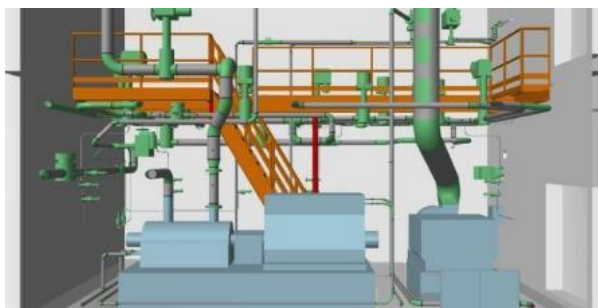
Project Manager IT-support system

Project Manager's portal





Multi-D
NIAEP || technology



2011:

Forum objective— tools of
complex engineering
projects
DESIGN

2012:

Forum objective— tools of
complex engineering
projects
CONSTRUCTION

2013:

Forum objective— tools of
operation
SUPPORT



Club 3D. Innovative engineering

JSC NIAEP and Innovative Engineering Association publish an international magazine "CLUB 3D. INNOVATIVE ENGINEERING".

The magazine is oriented at experience exchange and development of competitive technologies of complex engineering projects design, construction and operation.

The magazine is published in Russian and English.

Our partners are invited to become authors of the magazine!

