ВНИИАЭС

Всероссийский научно-исследовательский институт по эксплуатации атомных электростанций

Development of science and technology support of NPP operation

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Mission

ВНИИАЭС

Provision of a broad range of science and technology support services to Rosenergoatom and nuclear power plants at all life stages of NPPs:

- ❑ development of requirements for new designs, verification of designs
- ❑ operation, maintenance and repair, upgrading and life extension of existing NPPs
- ❑ decommissioning, including radwaste reprocessing technologies

Design → Construction → Commissioning → Operation → Decommissioning

While continuously improving technologies of management of research, science and technology information, knowledge, and advancing skills of the personnel

today

ВНИИАЭС

Research, design and engineering organization in the nuclear power which deals with:

Problems of NPP operation and scientific and technical support aimed at enhancement of reliability, safety and economics of NPP power units

→ Scientific supervisor of NPP operation

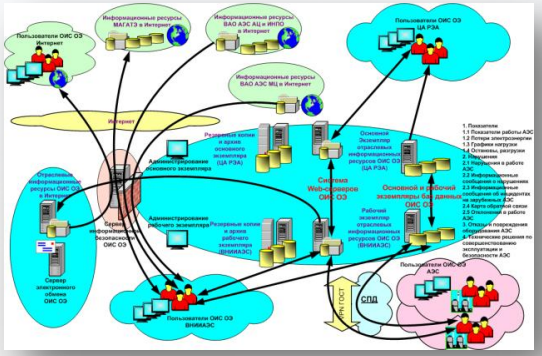
Development of NPP control systems, software&hardware complexes, IT-technologies

→ Chief designer of APCS for VVERs

Development of technical requirements for, concepts of new NPPs with VVER reactors; their peer review, virtual models of NPPs

→ Architect engineer of VVER-TOI design

Scientific and technical support (STS) of operation. Main areas



- Collection, systematization, treatment, accumulation, analysis and use of operating experience of Russian NPPs

- Establishment and keeping a set of industry-wide databases on NPP performance indicators, operating events and deviations, failures and damages of NPP equipment, engineering solutions for enhancement of operation and safety of NPPs

- Scientific & technical support of NPP operation in the area of water chemistry of plant circuits and operation of associated supporting systems

Scientific and technical support of operation. Main areas

- Scientific supervision over startup of NPPs in Russia

- Follow-on of operation of NPPs with VVERs

- Follow-on of operation of NPPs with RBMKs

Scientific and technical support of operation. Main areas

- Follow-on of works to support radioactive waste and spent nuclear fuel management

- Refining of the concept, improvement of designs and revision of the approach to NPP decommissioning management

- Follow-on of works to support radiation safety, environmental management and labor protection at NPPs

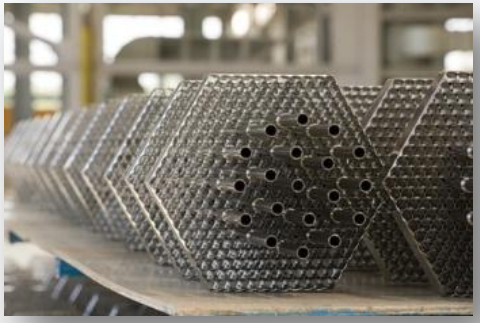
Scientific and technical support of operation. Main areas

- Scientific & technical support of Maintenance and Repair of NPPs

- Enhancement of process engineering and labor in nuclear power

- Economic follow-on of operation, risk assessment for changes

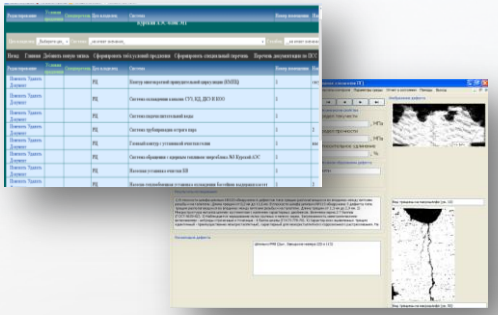
Development of STS means development of VNIIAES



• Improvement of nuclear fuel consumption efficiency

• Mathematic modeling of processes and plant as a whole

Scientific and technical support of operation. Main areas

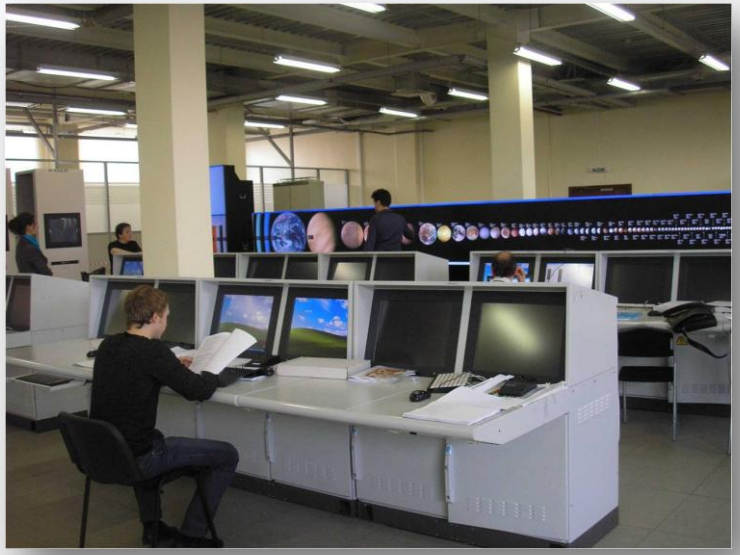


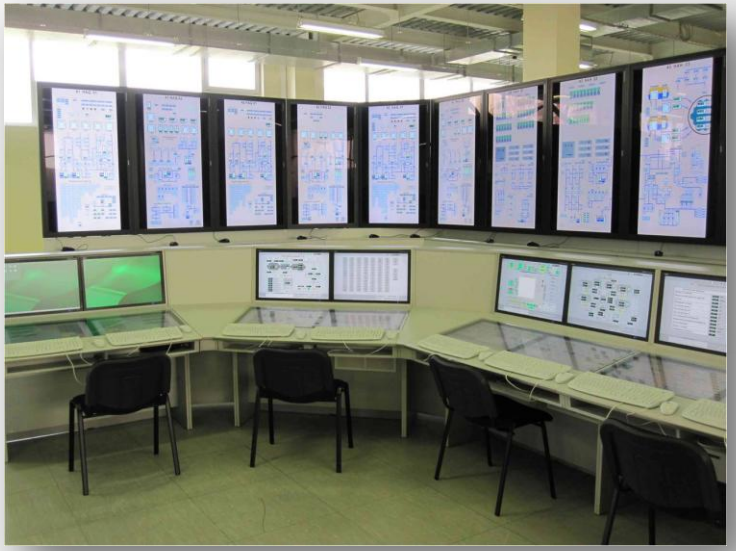
• Refining of the regulatory basis, databases of technical conditions, operating conditions and service life management of NPP power unit components aiming at life extension

• Follow-on of operation of NPP electrical equipment

• Ensuring reliability of human factor and training of the personnel

Simulators





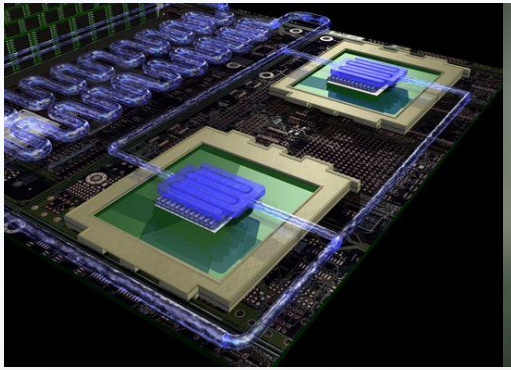
Design, development and supply of simulators:

- full-scale
- analytical
- simulators of equipment and systems of existing and being constructed NPPs

APCS

Design, development and supply of up-to-date APCS complexes for NPPs

VVER-TOI



Development of the design improvement concepts:

- Operation
- M&R (including diagnostics systems)
- NPP controls
- Construction within 40 months.
- Environmental safety (including radwaste and SNF management)
- Use of heat storage systems

Economic modeling, calculations, cost assessment

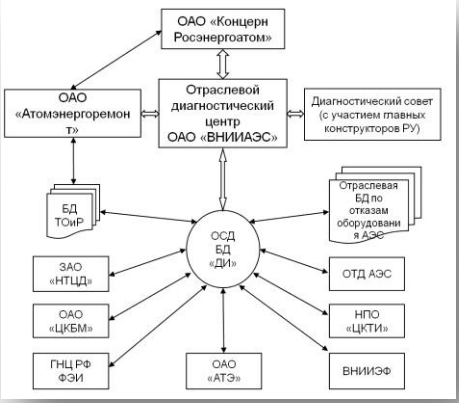
Development of the project management improvement concept

- Creation of the Common Information Space
- Management of engineering data

Design verification using mathematical models

- Correction of design errors
- Check of conformance to Customer's and Terms of Reference requirements

Development of STS means development of VNIIAES



- Commissioning of a component of Industry Diagnostics System at Kalinin NPP

- Implementation of the condition-based maintenance approach
- Revision of Tecspecs

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- Formation and justification of new approaches to management of changes

- Performance of calculations and justifications related to outsourcing of M&R personnel of NPPs

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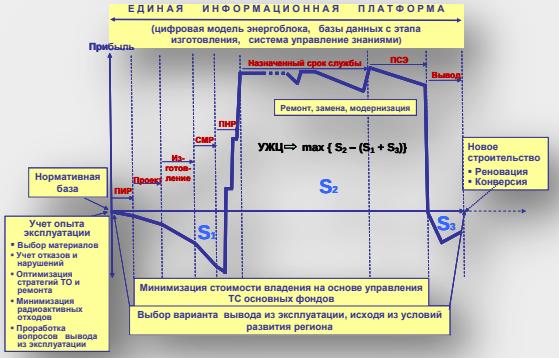
- Development of a methodological approach to assessment of operations economics and production cost price

- Within the RPS, the "Labor Institute" competences are being developed (norms, standards, etc.)

- Standard plant reserves of materials and equipment are being optimized

Development of STS means development of VNIIAES

- Improvement of the NPP personnel training programs (including overseas)
- Organization and conduct of training (retraining) of NPP management
- Capability of a Safety Culture course delivering on a regular basis
- Advancement of skills of VNIIAES personnel (including competences development – foreign languages, project management etc.)



- Formulation of requirements to a NPP life cycle management concept

Development of STS means development of VNIIAES

Application of international experience

Since November 2010 VNIIAES has been an INPO member

Росэнергоатом

Information exchange

OPERATING NPPs

Information exchange between NPPs

Exchange of information and rendering STS given the international experience

VNIIAES

- NPP operation assessment
- Event analysis and information exchange
- Personnel training and accreditation
- Technical support

INPO