ŠKODA JS

*The Power of Nuclear Engineering*



# Company profile



# About the company

Today‘s ŠKODA JS a.s. was founded in the mid-1950s, when the world was just considering nuclear power. Through the decades and up to the present day, it has not only kept pace with the development in the field, but in many cases the company helped to define it.

ŠKODA JS a.s. is a sought-after partner of all the significant global players within this modern and dynamic sector. The company has played a decisive role in the construction and maintenance of all six Czech nuclear units.

It has been and remains the bearer and pursuer of the best Škoda traditions, representing the continuity in innovation and technical progress.

We are one of the leaders of the nuclear power industry in Europe

We are a team of experts working with advanced technologies

We are a strategic and reliable partner, the bearer and pursuer of the best Škoda traditions

# Our strategic segments

Our business is built on three pillars that enable us to offer a broad portfolio of products and services. This makes us a strategic and reliable partner to large companies in the field of nuclear power engineering throughout the entire life cycle of a nuclear power plant.



## Engineering

- Construction and modernization of VVER nuclear units
- Supply and modernization of nuclear unit I&C systems
- EPC projects – comprehensive turn-key delivery of particular technological units
- Computational analyses for nuclear power plants and technological plants
- Design activities
- Piping systems in the power industry
- Owner's Engineering activities
- Spent fuel interim storage facilities
- Production, delivery and commissioning of research and training reactors
- Decommissioning of main components of the primary circuit



## Production

- Primary circuit components for VVER, PWR and BWR nuclear power plants
- Equipment for VVER, PWR and BWR nuclear power plants
- Equipment for research reactors
- Equipment for management, handling and storage of fresh and spent nuclear fuel
- Equipment for storage and transport of radioactive materials



## Service

- Reactor building equipment outage management
- Reactor building equipment maintenance and repairs
- Reactor building equipment modernization
- Reactor building equipment lifetime management and extension
- Service of manipulators for in-service inspections of the reactor building main equipment
- Designer's supervision during inspections and repairs of the reactor and its parts
- Accredited material laboratories
- Testing shops



# Engineering

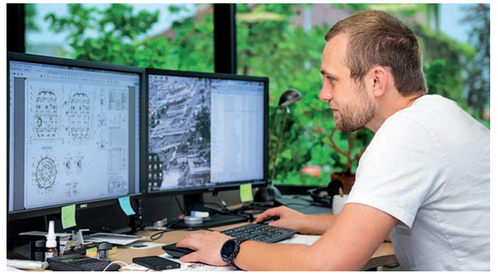
ŠKODA JS is a strategic and reliable partner for the delivery of complex investment units and specific engineering projects.
Our main field of activity is the construction and modernization of VVER power plants, the supply of safety and control systems and computational analyses. We want to participate on the construction of new nuclear power plants – not only traditional large power units, but also modular reactors called SMR, which have a great future potential. We will certainly not stand aside during the construction of new Czech nuclear units.



**We consider EPC engineering (Engineering, Procurement, Construction) as a complex process involving planning, design, implementation and coordination of all technical and engineering aspects of a project.**

## Engineering

includes a detailed design of the technical solution of computational analyses, enabling the development of a functional project. Engineering activities, in ŠKODA JS's concept, are divided into mechanical, electrical/I&C and civil engineering specialisations, depending on the nature of each project.



## Procurement

involves the production/purchase of the necessary materials, components and services that are required to complete a project. This stage also includes selecting suppliers, negotiating contracts and ensuring delivery in the required quality and timeframe.

## Construction

i.e. implementation, is the stage where the physical construction and installation of the equipment takes place, all in accordance with the approved documentation and construction plan. This phase also includes the coordination of subcontractors and the arrangement of works on the construction site following the agreed budget and schedule.

Complex coordination of these phases leads to more efficient construction and reduces costs of EPC projects.

# Engineering | Activities

## Construction and modernization of VVER nuclear units – primary circuit system and fuel handling system

- Project management
- Design activities
- Calculations and safety analyses
- Research works
- Component manufacture and delivery
- Installation works
- Commissioning

## Computational analyses for nuclear power plants and technological plants

- Neutron physics
- Radiation safety
- Thermohydraulic
- Strength calculations including piping systems





## Supply and modernization of nuclear unit I&C systems

- Replacement of primary circuit control systems
- Replacement of turbine control systems
- Replacement of secondary circuit control systems
- Complete replacement by modern digital systems
- General interconnection of the modernized systems with the current power plant equipment

## Design activities

- Project documentation of all stages
- Laser scanning and 3D models
- Technical preparation of installations

## Piping systems in the power industry

- Project documentation of all stages
- Supplies and installations

## EPC projects – comprehensive turn-key delivery of particular technological units

## Owner's Engineering activities

## Spent fuel interim storage facilities

## Production, delivery and commissioning of research and training reactors



## Decommissioning of main components of the primary circuit

- Decommissioning plan
- Preparation of documentation including specification of tools and equipment for decommissioning
- Decontamination, dismantling, fragmentation and disposal of equipment





# Production

We have been developing the production of components for VVER, PWR and BWR light water reactors and components for research reactors for more than forty years. In the early 1990s, we further focused on the modernization and lifetime extension of existing components in the VVER power plants as well as on the supply of spare parts.

We are constantly innovating and investing in new technologies, we work with unique materials. We develop and manufacture equipment for nuclear power plants, tailored to customer requirements.



We have been operating in the VVER nuclear technology market for more than half a century and during this time we have produced 21 complete VVER-440/V-213 type reactors and three VVER-1000/V-320 type reactors, including the control rod drive mechanisms. For thirty years, we have also been active in the market of PWR and BWR-type nuclear power plants.

Currently, our production flagship is the ŠKODA 1000/19 cask (for VVER-1000 reactor spent fuel) and the ŠKODA 440/84 cask (for VVER-440 reactor spent fuel). We have developed and now manufacture compact storage racks for spent fuel of our design. One of our promising products is the storage cask for various types of fuel, nuclear waste and radiators, which we develop, license and supply. An excellent example is the ŠKODA VPVR/M cask for transport and storage of spent fuel for research reactors – originally designed for transport of Russian-type fuel, now modified for transport of Chinese MNSR fuel, and also US Triga and MTR fuel.

We are one of the main suppliers of EPR 1600 reactor internals. Our reactor internal parts are installed at Olkiluoto NPP in Finland and Taishan NPP in China. We have signed contracts for several other sets of internal parts for British nuclear power plants, which we are currently manufacturing. We also can manufacture and supply other components for the primary circuit of nuclear power plants, including engineering and in-house development.

Our key products are modernized control rod drive mechanisms, which we produce and supply for various types of nuclear power plant reactors as well as research nuclear reactors, including the I&C system. Thanks to our innovations, we have been able to gradually increase their design lifetime and meet all technical and legislative requirements for extended reliable operation of control rod drives in both standard and emergency mode.

# Production | Activities



## Primary circuit components for VVER, PWR and BWR nuclear power plants

- Complete reactor vessels
- Reactor internal parts
- Pressure vessels, pressurizers, heaters
- Piping parts
- Supporting structures of the primary circuit



## Equipment for VVER, PWR a BWR nuclear power plants

- Control rod drive mechanisms with conventional motors and gearbox (e.g. type PRO for VVER-440)
- Linear step drives LKP-type (e.g. for VVER-1000)
- Service equipment – reactor main flange joint stud tensioners, upper block flange joint tighteners, equipment for removal, transport and disposal of neutron flux sensors and thermocouples from VVER reactors
- Hermetic cable and piping penetrations
- Components for performance and heat measurement – in-core neutron flux measurement channels and thermocouples
- Fresh fuel components
- Nickel and graphite flange gaskets
- Spare parts for existing power plant equipment

## Equipment for fresh nuclear fuel storage

- Fresh fuel storage racks and storage tanks type VVER-1000, VVER-440

## Equipment for spent nuclear fuel storage

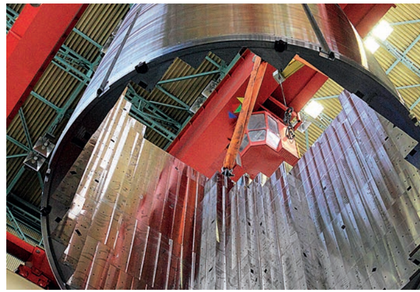
- Compact spent fuel storage racks type VVER 1000, VVER 440 and for western fuel type
- Spent fuel transport and storage casks type ŠKODA 1000/19; ŠKODA 440/84; TUK; VTUK; ŠKODA VPVR/M (MNSR; MTR&TRIGA) for transportation and storage of spent fuel from research reactors
- Spent fuel cask transfer facility
- Stand for fuel assemblies inspections

## Equipment for research reactors

- Research reactor internals
- Control rod drive mechanisms for research reactors
- Test and experimental equipment for research reactors (e.g. boiling crisis simulation, reactivity change simulation, etc.)

## Equipment for storage and transport of radioactive materials

- Storage casks for transport of radioactive emitters (PETA, 300TERA, TC1)
- Storage casks for transport of test samples for VVER-440 a VVER-1000 power plants (KSV440, TKSV1000)





# Production | We have a unique machine park

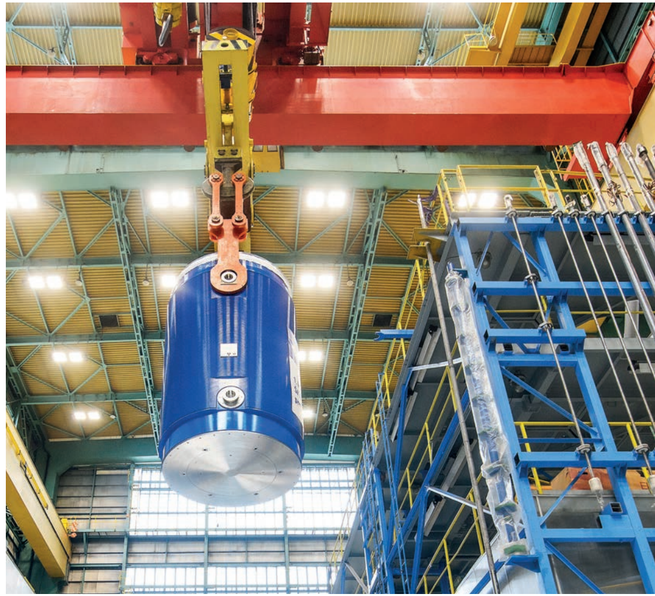
**In our plant called the Reactor shop there are, for example:**

- Vertical Turret Lathe Schiess 80 DV/23 (load capacity 315 t, table diameter 6,500 mm, max. height of workpiece 10,000 mm)
- Lathe SIU 400 (load capacity 250 t, max. workpiece diameter 4,000 mm, max. workpiece length 15,000 mm)
- Deep-boring machine WOHLENBERG – PB3 – 1120 P (drilling depth up to 5,000 mm, bore diameter up to 200 mm)
- Dual Spindle Portal Milling machine WPA 60 – NC (max. workpiece weight 125 t, max. workpiece width 6,000 mm, portal travel up to 14,400 mm)
- Machine shop with horizontal milling machines W 250 G – NR / HCW3, WEQ 200 NC/17000 / HCW2 and WEQ 200 NC/4000 / HCW2 (workpiece weight up to 300 t on skirting field or 350 t on rotary table, spindles diameter 200 mm, travel along the workpiece from 4,000 mm up to 15,500 mm)
- Welding head ESAB HNG 550-S for narrow-gap submerged arc welding (max. wall thickness of the weldment 550 mm)
- Crane equipment with loading capacity from 5 to 400 t

In the Bolevec plant, we have a wide range of NC and CNC lathes, machining centres, horizontal boring machines, milling machines and grinders for small and precise parts from renowned companies such as ŠKODA, WEILER, TOS, MAZAK. In addition, in the Bolevec plant we have a special laser welding machine LASERLINE LT-LW-11 kW for welding hexagonal pipes (longitudinal weld up to 5,500 mm, welding thickness up to 10 mm) and a stall for electron beam welding EBW 5002/15-60 CNC with a vacuum chamber with a capacity of 5 $m^3$.

**We can heat-treat, weld, mechanically machine, blast or perform colour surface treatment of standard and oversized structures, forgings, castings and weldments from carbon and stainless steel.**








# Service

We are the general contractor for maintenance and repairs of main components of primary circuit in the reactor building at all six units of the Czech nuclear power plants Temelín and Dukovany.

The service of important components of VVER-type nuclear power plants has a long-standing tradition at ŠKODA JS. Thanks to our experience, practice and know-how we are a strong and reliable partner for our customers.



The Service division represents one of the three core pillars of ŠKODA JS. Its domain includes a wide range of services we offer and provide to our customers and partners, nuclear power plant operators. We are viewed as a strong and reliable partner capable of ensuring deliveries within the entire lifecycle of nuclear power plants. Our common goal is to maintain their safe, effective and reliable operation.

We are the general partner for maintenance and repairs of primary circuit systems at all six nuclear units operated in the Czech Republic – the Temelín NPP (VVER-1000) and the Dukovany NPP (VVER-440). Specifically, we ensure the maintenance of the reactor building logical unit. Our regular activities include lifetime management of essential components of the plant‘s primary circuit.

Our material laboratories perform standard material tests and expert examinations within production, service or development contracts. We are an accredited testing laboratory pursuant to ČSN EN ISO/IEC 17025 standard. Important activities of the material laboratory include the assessment of inspected weld joints for nuclear power plants.

The testing shops are a specialized facility where using a unique test loop we perform handover tests of PRO-M control rod drives and LKP-M linear step drives. For external companies, the testing shops carry out hydraulic tests of fuel assembly dummies and verify the tightness of flange joint mock-ups. At the LKP 1000 stand, for example, we performed the hydraulic tests of a new fuel assembly dummies.

# Service | Activities



## Reactor building equipment outage management

- Service of primary circuit systems and fuel handling part for Temelín NPP
- Service of primary circuit systems and fuel handling part for Dukovany NPP



## Service of manipulators for operational inspections of the reactor building main equipment

- Manipulators
- Tighteners
- Tools and equipment

## Accredited material laboratories

- Material testing and expert examinations carried out mostly as part of production, maintenance and development contracts
- Assessment of inspected weld joints for nuclear power plants
- Production of connectors and glass-sealed cable penetrations for PRO-M and LKP control rod drives

## Testing shops

- Testing of VVER control rod drive mechanisms
- Testing of VVER fuel assemblies

## Reactor building equipment maintenance and repairs

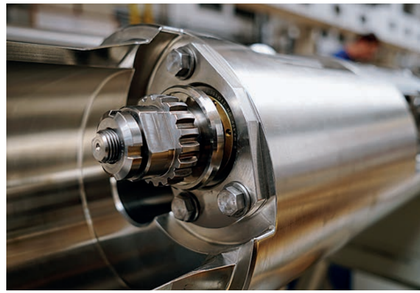
## Reactor building equipment modernization

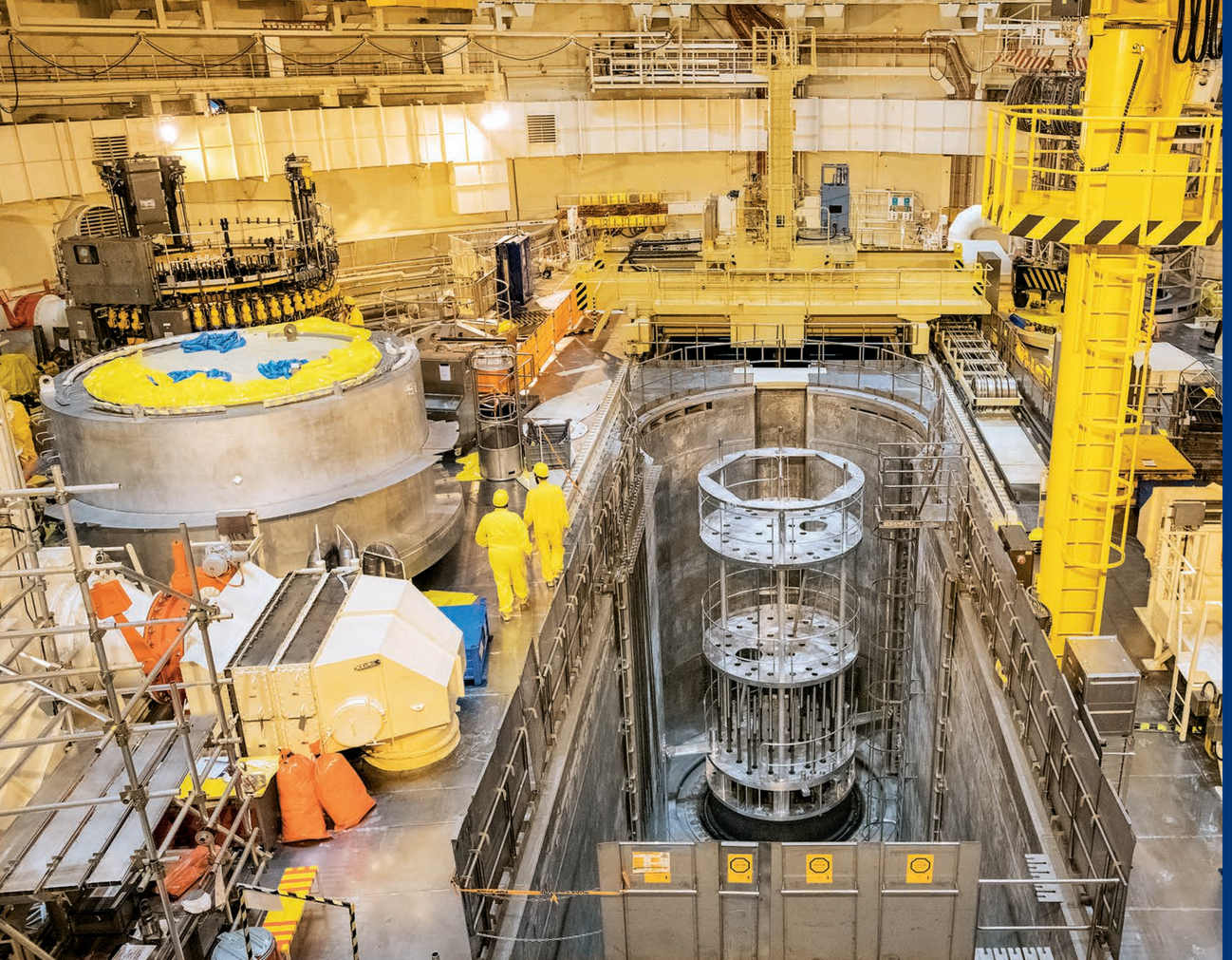
## Reactor building equipment lifetime management and extension

## Designer's supervision during inspections and repairs of the reactor and its parts







**Engineering, production, service**

**We have successfully completed number of unique projects**

**In-house development and custom-made products**

**That is our way forward**

**The nuclear power industry is and will continue to be a stable and sustainable source of energy**

ŠKODA JS

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