



SOLUTION FOR FUTURE



# ZAT

# Your Steady Partner

SAFE  
AND  
RELIABLE  
AUTOMATION



# Company Mission



- ***We focus*** on meeting the requirements of our customers based on our long-term knowledge of their needs.
- ***We focus*** on the branches demanding reliability, safety and an individual approach required especially in the branches of power generation, mining, transportation and healthcare.
- ***We implement*** our original control system as well as systems provided by other renowned producers.

## ■ The Headquarters:

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# Fields of Supplies



- **ZAT is a global provider of the complex automation for industrial processes:**
  - Automation for nuclear power generation
  - Automation for conventional power generation
  - Automation for technological processes
- **Production of Industrial Electronics**
- **Special Medical Devices**

# Investment in production technologies



**TWO SETTLING SMD LINES**

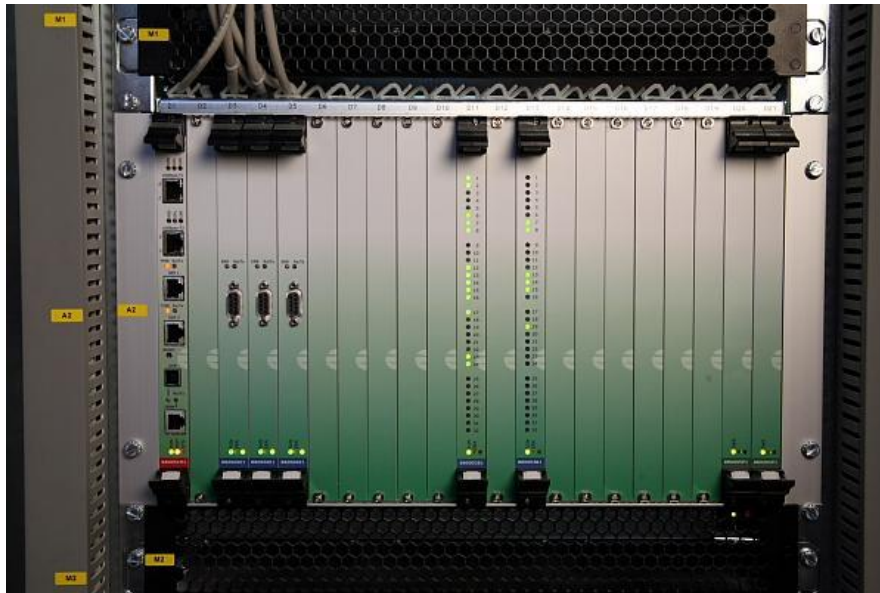


**ADAPTATION OF CURRENT PRODUCTION SPACES**

# Long-term Development



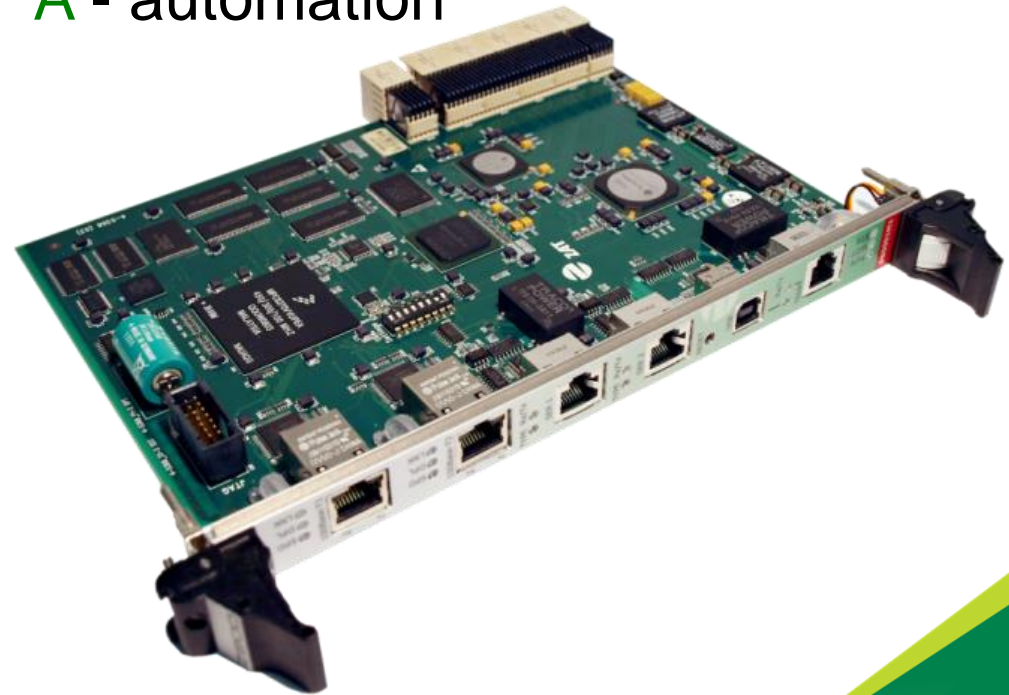
- *Development of the new generation control system (SandRA)*



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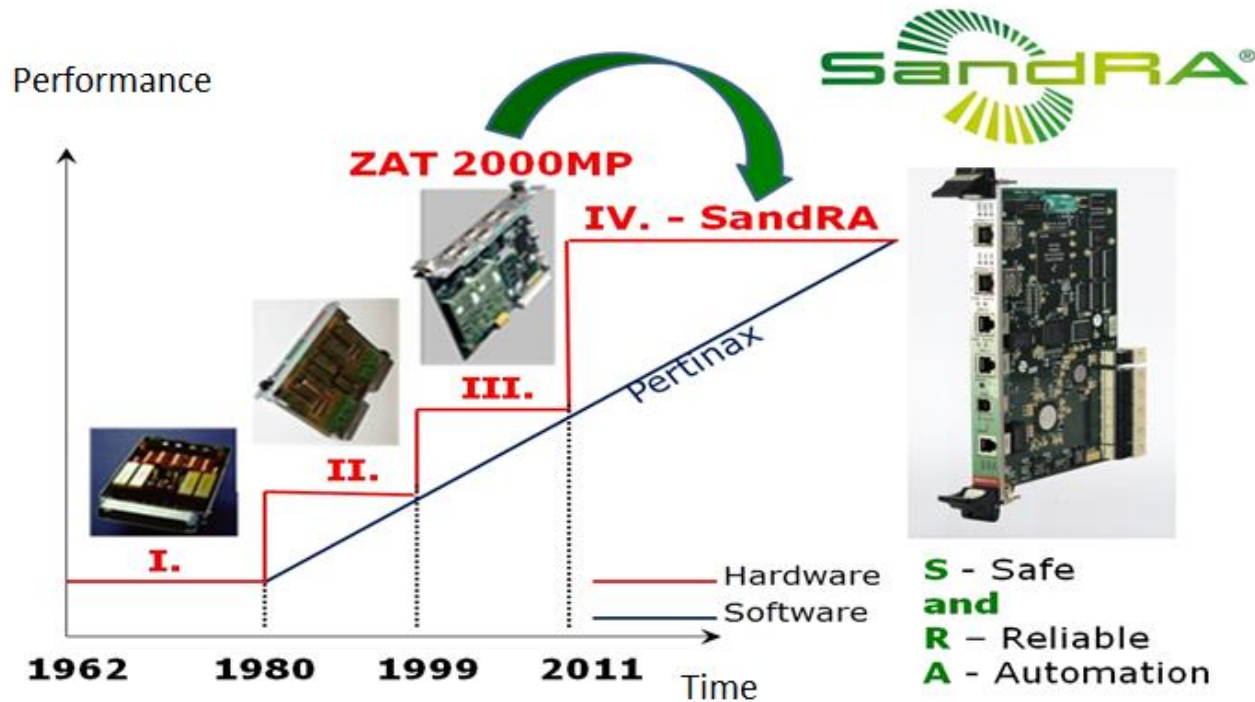


S - safe  
and  
R - reliable  
A - automation



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# ZAT- 4<sup>th</sup> Control Systems Generation



- I. Generation – DIAMO KSŘ, DIAMO K, DIAMO L, TVER
- II. Generation – DIAMO S, ZAT E, Primis (86,96)
- III. Generation – ZAT DV, ZAT Primis 2000
- IV. Generation – SandRA Z100, SandRA Z200



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# Nuclear Power



We operate in  
25 nuclear units in 4 countries



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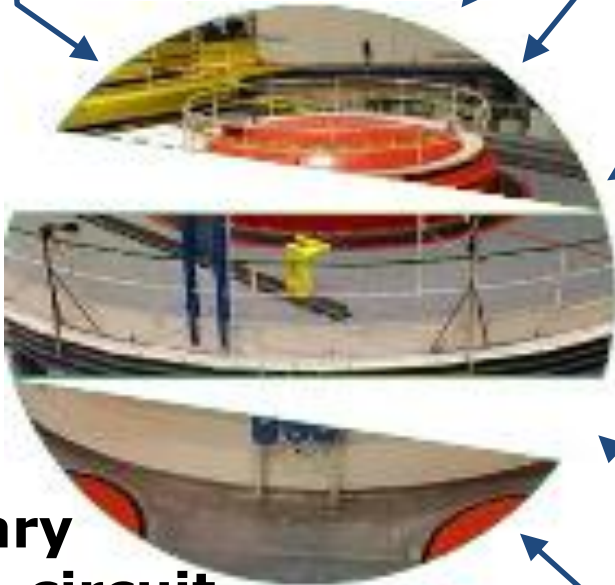
# Product Overview



**PAMS (B)**

Post-Accident  
Monitoring System

SRS



**Primary  
circuit**

**SAS** – Safety systems

**SRS** – Safety Related systems

**NSS** – Non safety systems



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NSS

**SGPS (C)**

Steam generator  
protection system

NSS

**RCS (C)**

Reactor control  
system

SAS

**RTB (A)**

Reactor Trip  
Breaker

**RRCS (B)**

Reactor Rod Control  
System

SAS SRS NSS

**NICS (A,B,C)**

Nuclear Island  
Control System  
(Primary Circuit)

NSS

**DIAG (C)**

Diagnostic and  
Information System

NSS

**PICS (C)**

Process Information  
and Control system

NSS

**In-Core (C)**

In-Core Verification

SRS

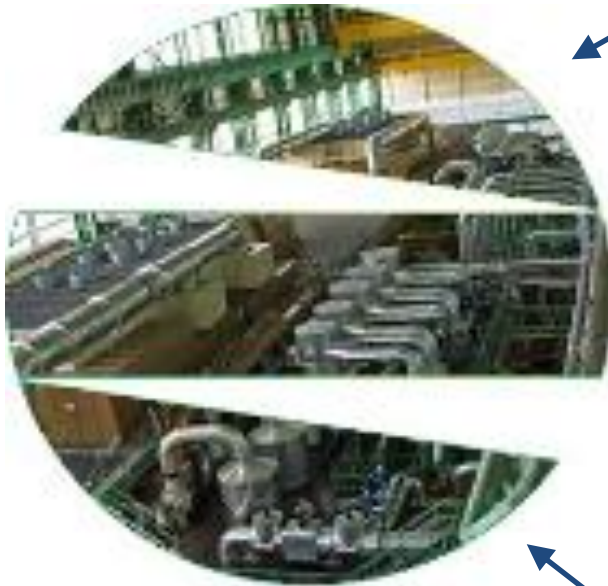
**RVLIS (B)**

Reactor Vessel Level  
Instrumentation

# Product Overview



## Secondary circuit



SRS NSS

TICS (B,C)

Turbine Island Control System

NSS

DIAG (C)

Diagnostic and Information System

SAS SRS NSS

NICS (A,B,C)

Nuclear Island Control System (Secondary Circuit)

NSS

PICS (C)

Process Information and Control System

NSS

BS

Excitation System

NSS

MDS-SO

Monitoring and Diagnostic System of Secondary Circuit

SAS – Safety systems

SRS – Safety Related systems

NSS – Non safety systems



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# References for Nuclear Power Generation NPPs in the Czech Republic



## ČEZ a.s., NPP Dukovany 4x VVER 440MW

- Reactor Rod Control System (RRCS)
- Process Information and Control system (PCS)
- InCore Verification (In-Core)
- Steam Generator Protection System (SGPS)
- Diagnostic and Information System (DIAG)
- Primary Circuit Control System (NICS/ŘSBP)
- Secondary Circuit Control System (NICS/ŘSBS)
- Turbine Control System (TCS / ŘSBT)



## ČEZ a.s., NPP Temelin 2x VVER 1000MW

- Assembly and testing of control systems WDPF II. (Westinghouse)
- Balance of Plant Control System (BoP)
- Diagnostics of the secondary part (MDS-SO)
- Reactor Rod Control System (RRCS)

# References for Nuclear Power Generation NPP abroad



## Slovakia - SE a.s., NPP Bohunice 2x VVER 440MW

- Process Information and Control system (PCS)
- InCore Verification (InCore)
- Reactor Vessel Level Instrumentation (RVLIS)
- Excitation System (BS)

## Slovakia - SE a.s., NPP Mochovce 2x VVER 440MW

- Reactor Rod Control System (RRCS)

## Ukraine - NPP Zaporozhskaya, 3x VVER 1000MW

- Reactor Rod Control System (RRCS)

## Ukraine - NPP Khmel'nitskaya, 1x VVER 1000MW

- Reactor Rod Control System (RRCS)



# References for Nuclear Power Generation NPP abroad



## Ukraine – NPP Rovenskaya, 1x VVER 1000MW

- Reactor Rod Control System (RRCS)

## Ukraine – South-Ukraine NPP, 1x VVER 1000MW

## France - EDF, 8x NPP, 20x 1300MW

- Diagnostics and Information System (cabinets KCF)

## New projects:

## Slovakia - SE a.s., NPP Bohunice 2x VVER 440MW

- Reactor Rod Control System (RRCS)

## Hungary – Paks I., 4x NPP 440MW

- Reactor Rod Control System (RRCS)
- Reactor control system (RCS)
- Reactor trip breaker (RTB)



# ZAT NPP Project in the World

## Unfinished Projects



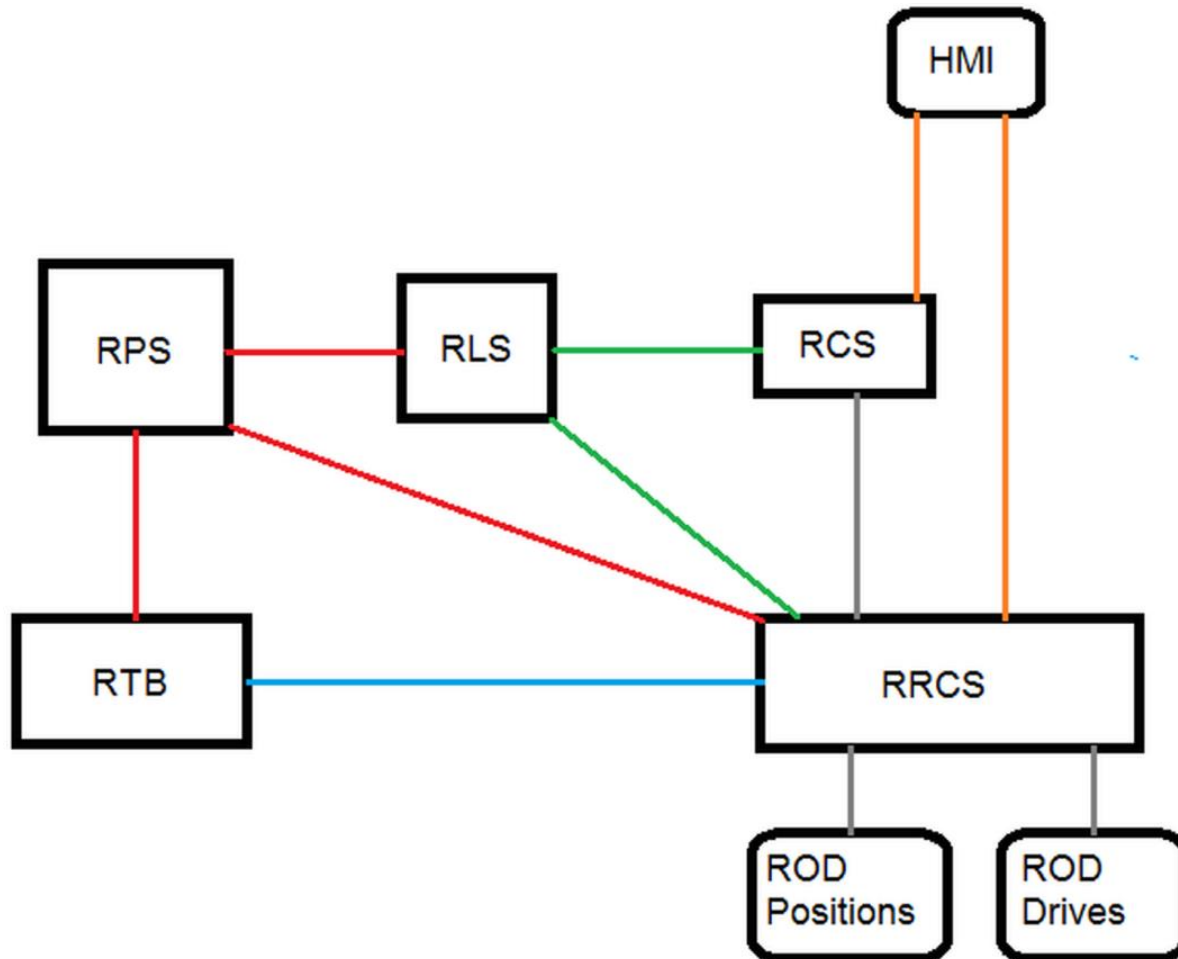
# History of the WWER RRCS design, manufacture and delivery



1993	Design, manufacture and functional tests on inverter (frequency convertor) for RD42 motor control. This module was intended to replace the existing PNČI unit. The inverter was designed as a microcontroller-based device.
1998	Commencement of the project work on RRCSs (CYOP-M) for units 1 and 2 of Rovenska NPP in the Ukraine.
7th.sept. 2000	Contract was signed between the companies ŠKODA JS a.s. and ČEZ a.s. on modernisation of all 4 units of NPP Dukovany where ZAT was a subcontractor supplying, among other things, the unit RRCSs.
2003	Delivery of test-stand equipment for CRA drives of unit 4 of NPP Dukovany.
2004 – 2005	Trial operation of SORK cabinet (complete control system for one RM drive) for unit 3 of NPP Dukovany.
1996 – 2006	<b>RRCS delivery to Ukrainian NPP's, 9 Units 1000MW.</b>
2005-2009	<b>RRCS delivery to Czech NPP Dukovany, 4 units 440MW.</b>
2011	<b>New RRCS generation delivered for Slovak NPP Mochovce, 2 units 440MW.</b>
2015	Working on project of RRCS for NPP Paks and NPP Jaslovske Bohunice - - total amount 6 units WWER 440MW.



# Reactor rod control system – I&C connection



# HMI – Operator's panel

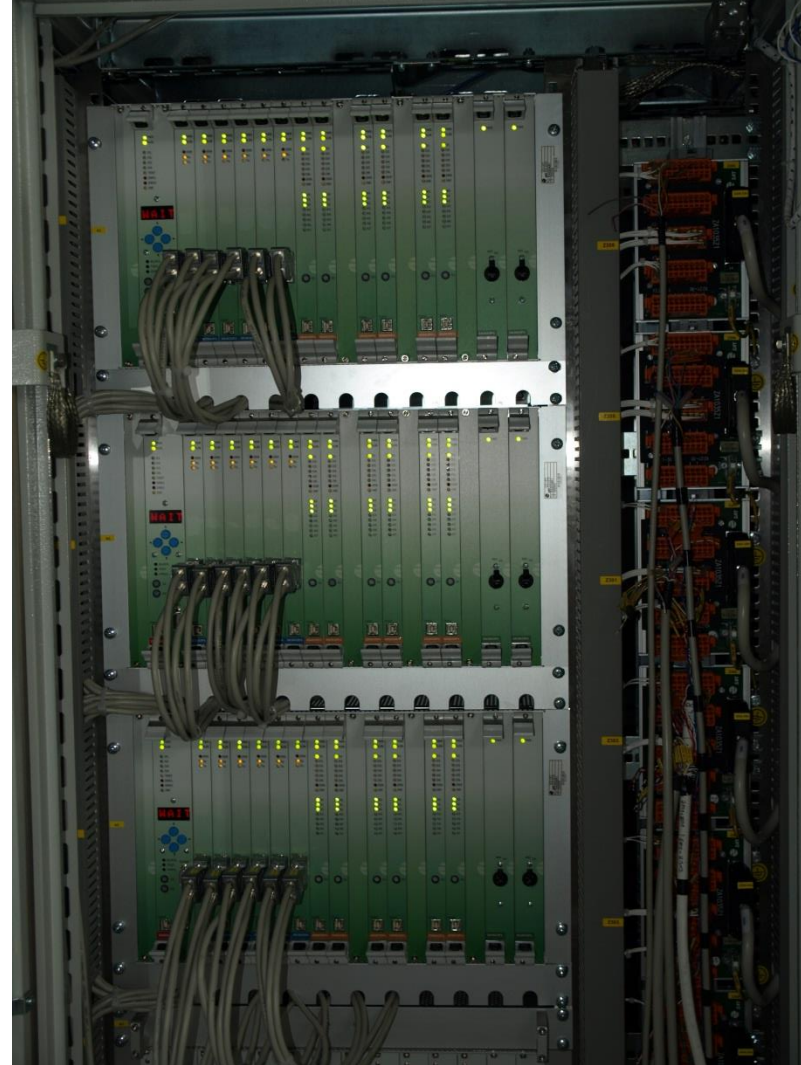


# Diagnostic cabinet



- Monitoring of parameters
- Monitoring of standard in-built auto-diagnostic functions.
- Errors archiving.

# Group and individual control



# Position evaluation cabinets



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# Motor control cabinets



**Small – Modular – Compact - Reliable**



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# Licensing



- Supplied equipment is qualified by ZAT (seismic, EMC, temperature, ...)
- Adapting to regional requirements
- We start from already completed projects





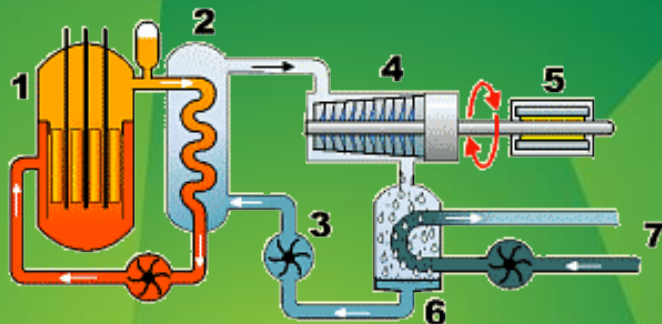
## **The scope of supply and services supplied in frame of the contract:**

- ✓ **Documentation of quality assurance system**
- ✓ **Project documentation and documentation - as built**
- ✓ **Manufacturing, assembly on site, qualification**
- ✓ **support of the licensing process**
- ✓ **Startup including testing**
- ✓ **Operators and staff training**
- ✓ **Guarantees for the entire delivery**
- ✓ **warranty, post-warranty and guaranteed service**





# Thank You for Your Attention!



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