A large, abstract graphic on the left side of the slide, featuring overlapping green and white curved lines that resemble a stylized plant or a dynamic motion graphic.

ATOMEX
25-26.10.2011 Prague

I&C SYSTEMS ZAT a.s.

CZECH REPUBLIC & NUCLEAR

- The **Czech Republic** is one of the European countries able to design, construct and safely operate **nuclear power plants** with the involvement of a substantial share of domestic industry, including the manufacturing of many important power plant components, such as :
 - Reactor vessels, steam generators, coolant circuit pipes, pressurizers
 - Turbines
 - Control rod drives
 - Electrical equipment
- **Instrumentation and control systems**
 - Radiation protection and monitoring systems
 - Physical protection system etc


ZAT a.s.

- Leading enterprise in Czech Republic on designing, manufacturing and implementation of I&C systems at the power engineering utilities.
- Production is verified certificates internationally recognized organization and the company is authorized to supply I&C systems for Nuclear Power Plants.



LICENCE AND QMS

Designing, manufacturing, delivery and maintenance of the equipment for NPPs is carried out in line with a licence issued by the State Office for Nuclear Safety (SÚJB) of the Czech Republic and with the Quality Management System DIN EN ISO 9001:2008 certificate issued by Det Norske Veritas certification authority.



DET NORSKE VERITAS
MANAGEMENT SYSTEM CERTIFICATE

Certificate No.: 54345-2009-AQ-CZS-RvA

This is to certify that the Management System of:

ZAT a.s.

K Podlesi 541, 261 80 Příbram VI, Czech Republic
Písecká 16, 323 00 Plzeň, Czech Republic

has been found to conform to:

ISO 9001:2008

This Certificate is valid for the following product or service ranges:



Development, design engineering, production, installation and service of electronic devices, control systems and their components aimed to power industry, control of industrial processes and transportation systems, deliveries of capital equipment, ensuring of complex deliveries and system integration.

Initial Certification date:
June 1st, 1997

This Certificate is valid until:
May 26th, 2012

The audit has been performed under the supervision of
Evangelos Tavandžis
Lead Auditor

Place and date:
Prague, May 26th, 2009
for the Accredited Unit:
DNV CERTIFICATION B.V.,
THE NETHERLANDS



János Zrupkó
Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.
HEAD OFFICE: Det Norske Veritas AS, Veritasveien 1, 1322 Hovik, Norway. Tel: +47 67 57 99 00 Fax: +47 67 57 99 11 - www.dnv.com

АУДИТЫ И СЕРТИФИКАТЫ



DET NORSKE VERITAS MANAGEMENT SYSTEM CERTIFICATE

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**СИСТЕМА СЕРТИФИКАЦИИ ГОСТ Р
ГОССТАНДАРТ РОССИИ**

СЕРТИФИКАТ СООТВЕТСТВИЯ

№ **РОСС CZ.H003.B02913**
Срок действия с **03.07.2008** по **03.07.2011**
8172073

ОРГАН ПО СЕРТИФИКАЦИИ рег. № **РОСС RU.0001.11H003**
Орган по сертификации машин и оборудования для нефтегазового комплекса, электрических машин, сырья и материалов ООО «ТЕХНОНЕФТЕГАЗ»
119296, Москва, Ленинский проспект, 65, корп. 4, тел. (499) 135-81-12, тел./факс (495) 930-95-93
e-mail: ano-tng@yandex.ru www.tngz.ru

ПРОДУКЦИЯ **ПРОГРАММНО-ТЕХНИЧЕСКИЙ КОМПЛЕКС АВТОМАТИЗАЦИИ ЭЛЕКТРООБОРУДОВАНИЯ напряжением до 1000 В**
Комплектующие и запасные части – см. приложение на 8 л.
Серийный выпуск

КОД ОК 005 (ОКП): 42 5210

СООТВЕТСТВУЕТ ТРЕБОВАНИЯМ НОРМАТИВНЫХ ДОКУМЕНТОВ
ГОСТ 12997 (Пп. 2.16, 2.25, 2.27, 2.28, разд. 3), ГОСТ Р МЭК 60950, ГОСТ Р 51321.1 (МЭК 60439-1-92), ГОСТ Р 51318.22 (СИСПР 22-97), ГОСТ 51318.24 (СИСПР 24-97)

КОД ТН ВЭД России: 8537 10 100 0

ИЗГОТОВИТЕЛЬ «ZAT Pribram a.s.»
K Podlesi 541, 261 80 Píbram VI, Czech Republic

СЕРТИФИКАТ ВЫДАН «ZAT Pribram a.s.»
K Podlesi 541, 261 80 Píbram VI, Czech Republic
Тел. + 420 318 652 111, факс + 420 318 627 471

НА ОСНОВАНИИ протокола сертификационных испытаний № 103/950-08 от 05.06.08 Испытательной лаборатории Российского государственного университета нефти и газа им. И.М. Губкина», г. Москва (рег. № РОСС RU.0001.21НФ43); акта о результатах анализа состояния производства 10.04.2008

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ Знак соответствия по ГОСТ Р 50460 наносится на изделие и в сопроводительной технической документации.
Схема сертификации – 3а

Л.Л. Колесникова
Руководитель органа
В.Е. Попадзько
Эксперт

Сертификат имеет юридическую силу на всей территории Российской Федерации

НАЦИОНАЛЬНЫЙ ОРГАН УКРАИНЫ ПО СЕРТИФИКАЦИИ
Система сертификации УкрСЕПРО

СЕРТИФИКАТ
НА СИСТЕМУ УПРАВЛЕНИЯ КАЧЕСТВОМ

Зарегистрированный в Реестре
Системы сертификации УкрСЕПРО
"10" января 2005 г.
№ **UA 2.041.1380**
Действителен до: "08" января 2010 г.

П О Д Т В Е Р Ж Д А Е Т С Я , Ч Т О

С Т В О М при выполнении работ по производству, техническому обслуживанию и ремонту электрических комплексов (ПТК) управления и защиты (СУЗ) для объектов

З А Т а . с .
Kram VI, Чешская Республика

в Украине нормативными документами О 9001-2001 (ISO 9001: 2000, IDT), а также в соответствии с требованиями украинской системы качества, требованиям и путем проведения физического набора, регламентируются программой

наименованием предприятия «Государственный институт качества Украины» - органом по сертификации Киев, проспект Гоголя 53, тел. (044) 450-15-001 041 от 25.07.01г. на основании системы управления качеством.


В.Л. Терера
Украина

THE HEADQUARTERS AND WORKPLACES



ZAT a.s.

K Podlesí 541, 261 80

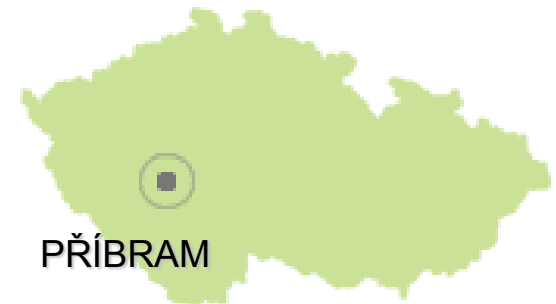
Příbram

Czech Republic

Tel.: +420 318 652 111

Fax: +420 318 627 471

E-mail: zat@zat.cz



PŘÍBRAM

PLZEŇ



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Písecká 16, 323 00 Plzeň

Czech Republic

Tel.: +420 377 438 111

Fax: +420 377 438 104

E-mail: plzen@zat.cz

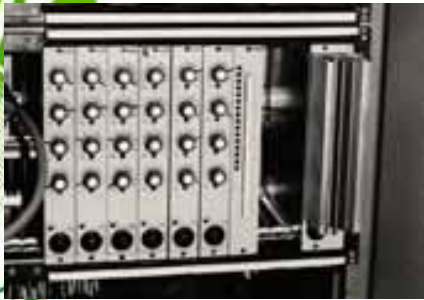


www.zat.cz

THE HISTORICAL MILESTONES - ZAT a.s.



1962 - Automation tools as part of the Uranium Industry Development Centre



1965 - First generation control system

1970 - Beginning of control systems applications for power generation branch

1970's - Boom of automated solutions export to important territories for the power generation, mining, transportation and other fields of industry



1980's – Development of automated systems based on microprocessor technology

1992 – Company privatization and modernization of the development and production technology



1997 – EN ISO 9001 certification

THE HISTORICAL MILESTONES - ZAT a.s.



2003 Acquisition of the power generation activities - ŠKODA Energo, Controls division

2005 Commissioning of the ZAT control system for I&C upgrade (part M1,M2), Dukovany Nuclear Power Plant, Czech Republic

2006 Construction of the new „Research – Development Centre“ in Plzeň, Czech Republic

2007 I&C reconstruction project – Dukovany Nuclear Power Plant (M3-M5 modules)

2009 Establishment of organisation unit in the Slovak Republic

2010 Start work _BID I&C systems for NPP TEMELIN 3&4

From 2000 until this time, the company nearly tripled annual sales and shifted from a supply control systems to engineering activities based on project management.

50 YEARS OF I&C SUPPLIES

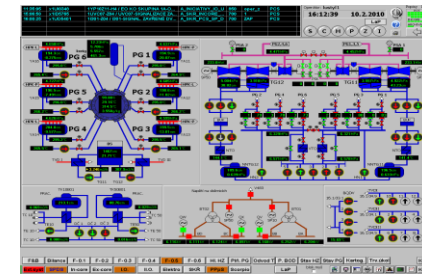
ZAT a.s. ACTIVITIES

- **Supplying the complex industrial automation solutions for the branches:**
 - **nuclear power generation**
 - **fossil power generation**
 - **hydro-power generation**
 - **gas distribution and product pipelines**
 - **transportation of freight and materials**
 - **mining industries**
 - **medical devices**



ZAT a.s. ACTIVITIES

1980 1st generation 8 bit I&C Systems
1990 2nd generation 16 bit I&C Systems
2000 3rd generation 32 bit I&C Systems
2010 4th generation (64) bit I&C Systems



- **Development of I&C systems**
- **Design of I&C systems**
- **Production of I&C systems**
- **Installation, testing, servicing & maintenance of I&C systems**

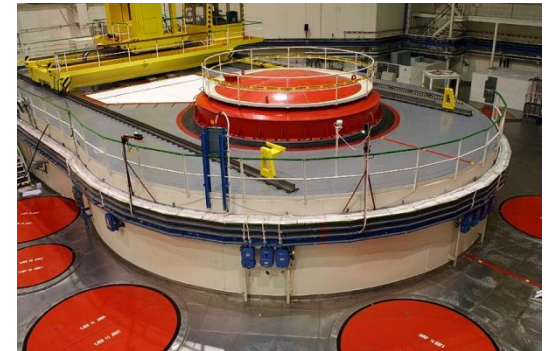
ENGINEERING ZAT FOR NPPs

Knowledge and experience with extensive projects of I&C systems for NPPs

- **Experience with legislation** (the Atomic Act No.18/1997, regulations, EUR,international standards ...)
- **Safety documentation**
- **Licensing**
- **Qualification**
- **Processes V&V (verification and validation)**

High technical potential

Guarantee of safe operation of industrial equipments



ENGINEERING_ PROJECT DOCUMENTATION

Basic design and Detailed Design documentation

Planning documentation

Safety analysis

V&V documentation

Test documentation (Factory test, commissioning, etc.)

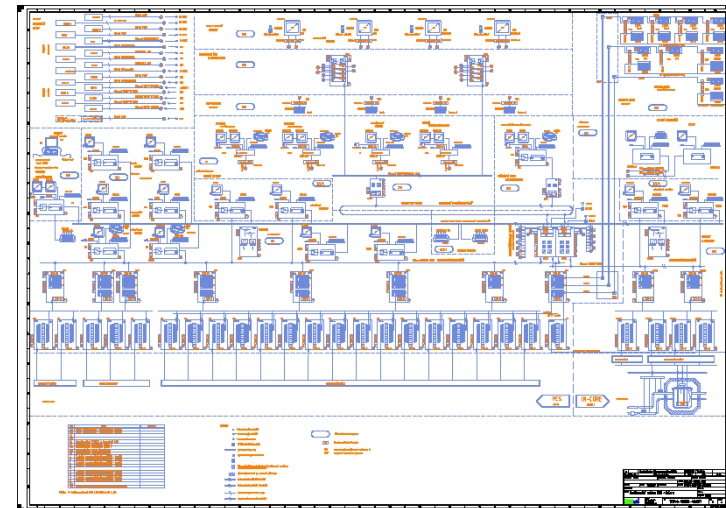
Installation documentation

Licensing documentation

- SW Project Management Plan
- SW Quality Assurance Plan
- SW Verification and Validation Plan
- SW Configuration Plan
- SW Development Plan
- SW Integration Plan
- SW Instalation Plan
- SW Operations Plan
- SW Maintanance Plan



The architecture of the ZAT 2000 MP I&C system has been consistently tailored to the process engineering needs of nuclear and conventional power plants.



QUALIFICATION



Temperature_tests



Seismic_tests



EMC_tests

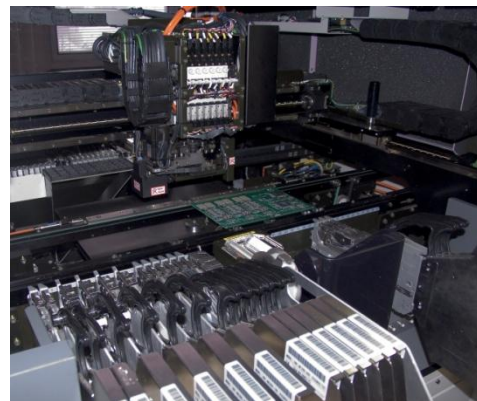
PRODUCTION AND TECHNOLOGICAL CAPABILITIES



The production facilities of ZAT a.s. are equipped with up-to-date high capacity technological and testing equipment which allows a complete cycle of manufacturing, adjustment and comprehensive testing of production with control assurance at all production stages.

Our production meets the requirements of IEC and IAEA, international standards and regulations for the I&C systems which are important for nuclear power plants safety.

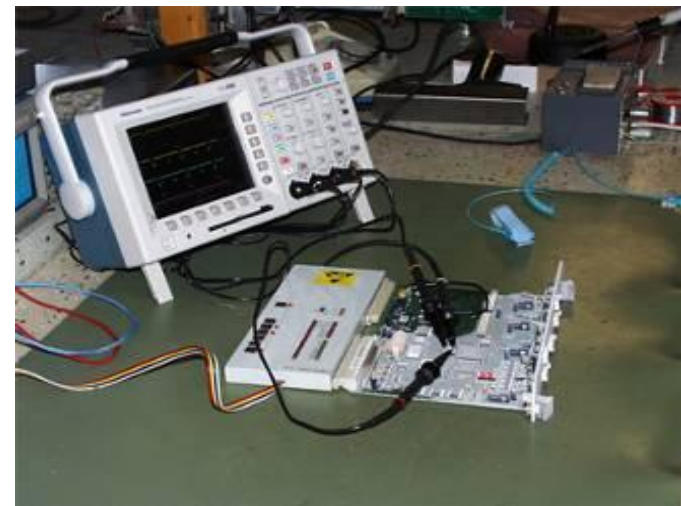
- 2 SMT production lines
- Automatic screen printer
- SMT Pick and Place Machine
- Inspection
- Reflow soldering + N₂
- Wave soldering + N₂
- Testing
- Services (electronic boards)



FUNCTION TESTS



- Testing
- Adjusting
- Controlling
- Burning Tests
- Service



I&C SYSTEMS FINISHING WORK

- Production facilities are completed in line with project documentation, procedures, and production plans.



Factory Acceptance Test

FAT examines the function of all inputs, outputs, processors, buses, operator and engineering workstations, and peripheral devices in the the configuration specification.



The FAT also tests all systems and application software that is a part of delivery.

ASSEMBLY ON THE SITE

The assembly of the I&C system is performed according to the project documentation, time schedule and control plans.

Plant cabling

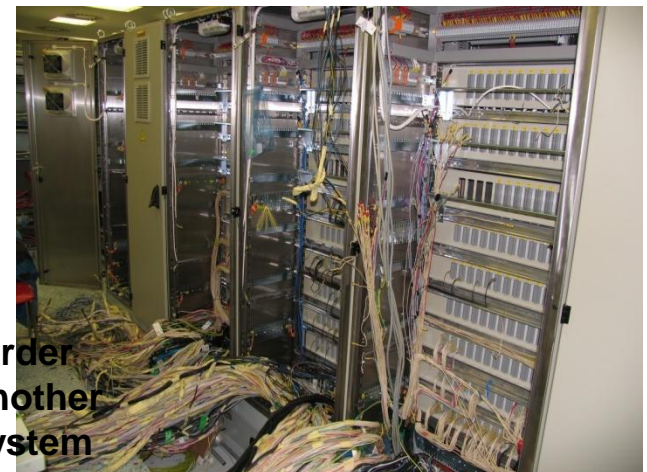
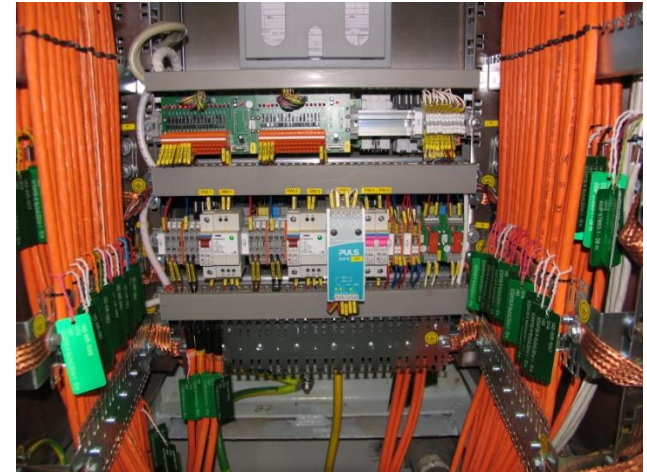
To connect the field devices to the cabinets, cable networks for analogue and binary signals acquisition are set up.

Site Acceptance Test

Once installed, the I&C system is tested (Site Acceptance Test - SAT) to verify that the system is installed correctly and its components properly connected

Commissioning

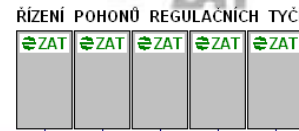
Commissioning denotes the activities which are required in order to check and adjust the transducer and actuator functions. Another commissioning function of the I&C system is testing of the system software.



ROADMAP I&C SYSTEMS ZAT FOR NPPs



UKRAINE, SLOVAKIA RRCS SYSTEMS



ŘÍZENÍ POHONŮ REGULACNÍCH TYČÍ

REGULAČNÍ TYČE

REAKTOR

PALIVO

SGIU-M (= *система групового и индивидуального управления – модернізована*)
for VVER 1000 nuclear reactors

- **2002 Delivery and commissioning of RRCS systems for NPP Zaporozska, block No.3**
- **2004 Delivery and commissioning of RRCS systems for NPP Zaporozska, block No.4**
- **2004 Delivery and commissioning of RRCS systems for NPP Chmelnicka, block No.2**
- **2004 Delivery and commissioning of RRCS systems for NPP Rovenska, block No.4**
- **2005 Delivery and commissioning of RRCS systems for NPP South Ukraine, block No.3**
- **2006 Delivery and commissioning of RRCS systems for NPP Zaporozska, block No.5**
- **2011 Delivery of RRCS systems for NPP Mochovce , blocks No.3,4**

NPP DUKOVANY I&C SYSTEMS ZAT MODULE M1,M2



- Recovery of I&C NPP Dukovany (Module M1,M2)
- 10 years cooperation with Škoda JS, I&C Energo, Framatome (Rolls-Royce) a ČEZ
- Successive applications of control system with significant know-how and experience
- In the period **2000-2009** supply **500 pcs** cabinets with I&C systems including application software

	System	NPP	Number of cabinets	Number of I&C boards	Commissioning
C	PCS, IN-CORE	Dukovany units 1,2,3,4	204	5000	2005-2009
C	SGPS	Dukovany units 1,2,3,4	16	600	2005-2009
B	RRCS	Dukovany units 1,2,3,4	224	2000	2005-2009

Delivery ZAT I&C systems for NPP Dukovany already 1985 year

NPP DUKOVANY I&C SYSTEMS ZAT MODULE M3,M4,M5



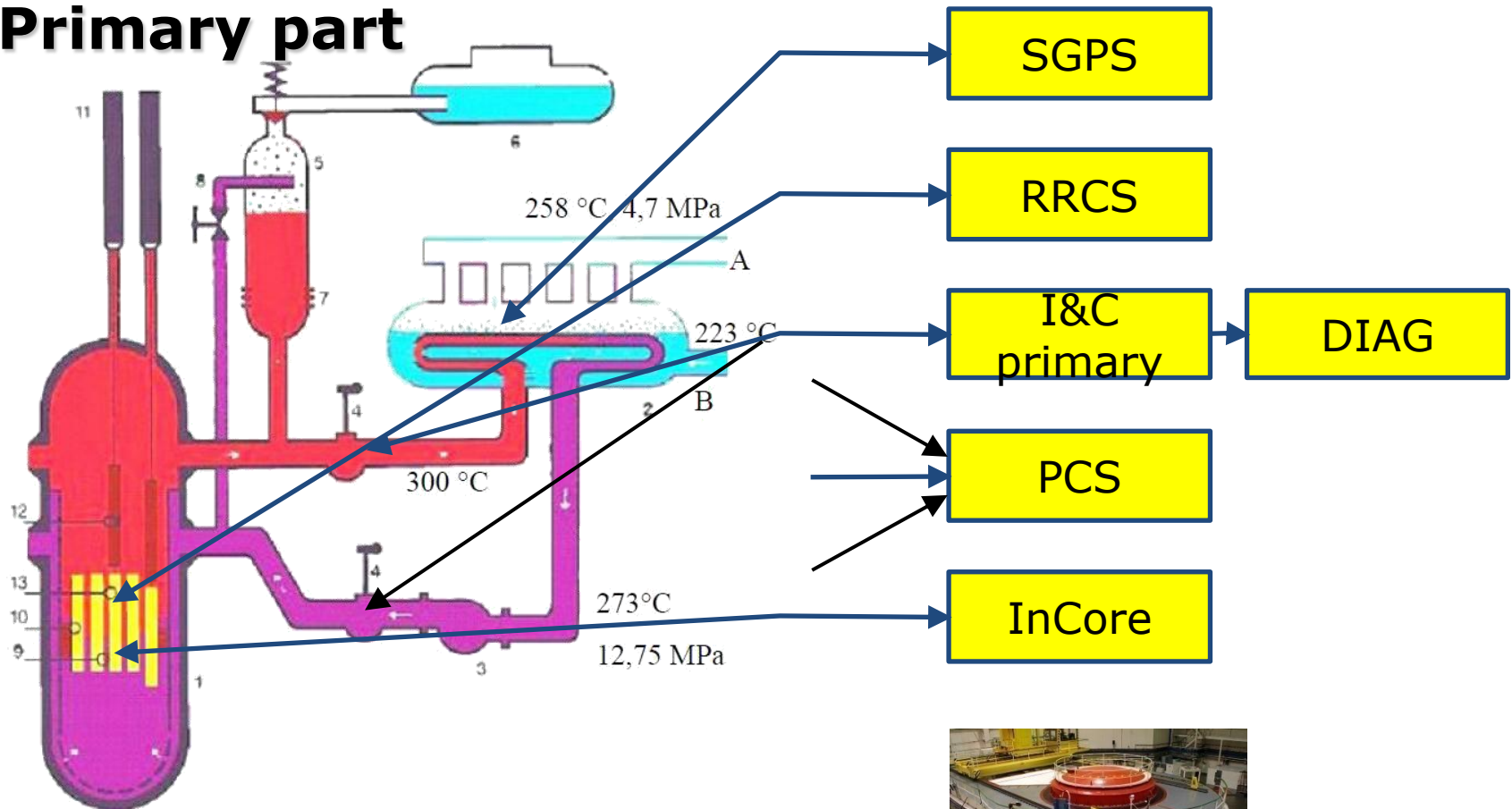
- Recovery of I&C NPP Dukovany (Module M3,4,5)
- Transfer of knowledge and experience of the module M1, M2
- In the period **2009-2016** supply **1414 pcs** cabinets with I&C systems including application software

I&C ZAT control all blocks 4x440 VVER ,without reactor protection systems (Framatome/Rolls-Royce)

Platform ↓	Module ⇒	M345	M3	M4	M5	M345
	System ⇒	DIAG	ŘSBP	ŘSBT	ŘSBS	ŘSBB(N)
A		--	ZAT-RA	--	ZAT-RA	--
B		--	ZAT-PRIMIS	ZAT-PRIMIS	ZAT-PRIMIS	ZAT-PRIMIS
C1		ZAT-FS	ZAT-DV	ZAT-FS ZAT-PRIMIS	ZAT-DV	ZAT-DV
C2		--	--	ZAT-PRIMIS	--	--

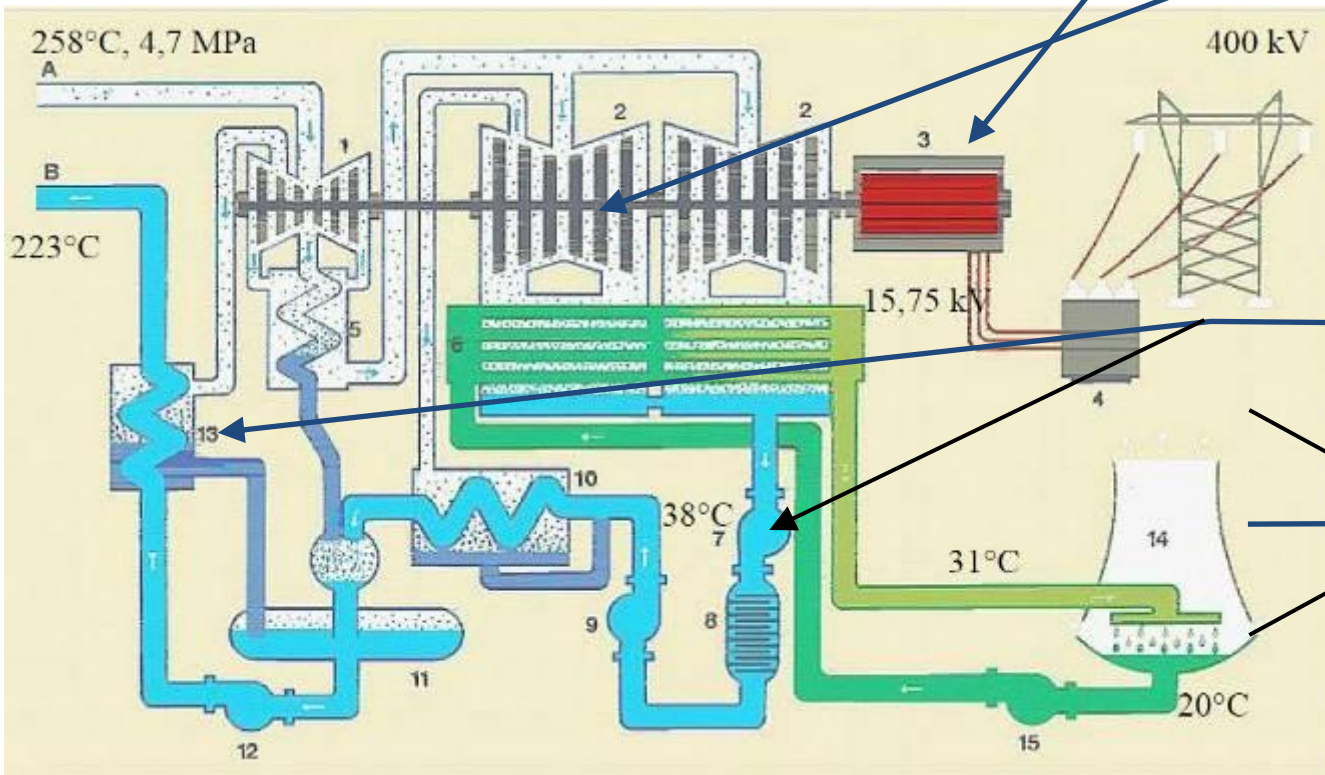
NPP DUKOVANY I&C SYSTEMS ZAT

Primary part



NPP DUKOVANY I&C SYSTEMS ZAT

SECONDARY PART



ES

I&C Turbine

DIAG

I&C secondary

PCS



NPP TEMELIN 1,2 _WESTINGHOUSE& ZAT



- **1992-2010** supply of the I&C systems ZAT for BoP, MDS SO, RRCS
- **1995-1998** finishing of work I&C system WDPF (Westinghouse)

ZAT assembly of the 850 pcs cabinets of I&C systems and testing I&C systems

- loading systems SW
- testing of systems function
- loading applications SW
- customer tests



NPP TEMELIN 3,4_Rolls-Royce&ZAT

IEC 61226

**A safety
category**
Rolls-Royce
SPINLINE 3



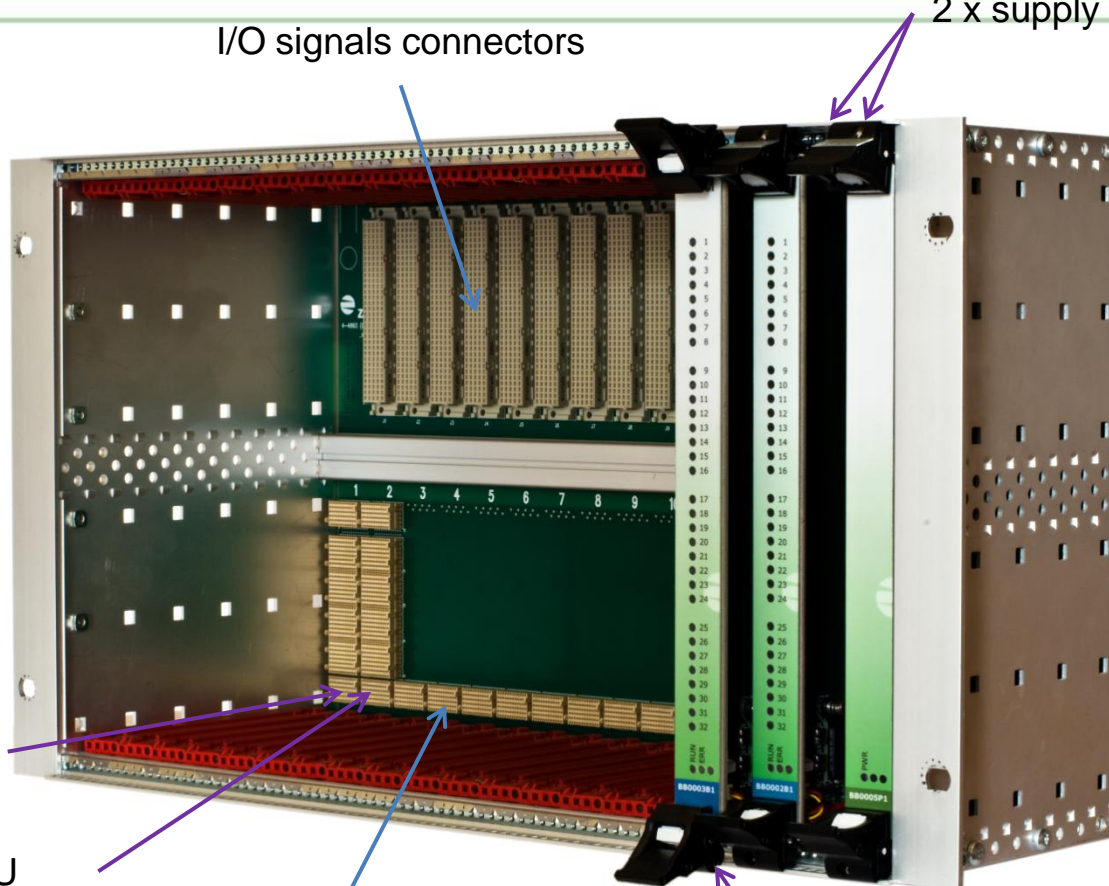
**B,C safety
category**
ZAT a.s.
SANDRA



I&C SYSTEM ZAT (SANDRA Z200)

I/O signals connectors

2 x supply unit position



CPU board position

Redundancy CPU
or I/O board position

Dual star RapidIO bus

Up to 19 I/O board position



6SVP-B

5SVP-A

4SVP-A

3SVP-A

2SVP-A

POBLOHA

POBLOHA

POBLOHA

POBLOHA

POBLOHA

ZAT

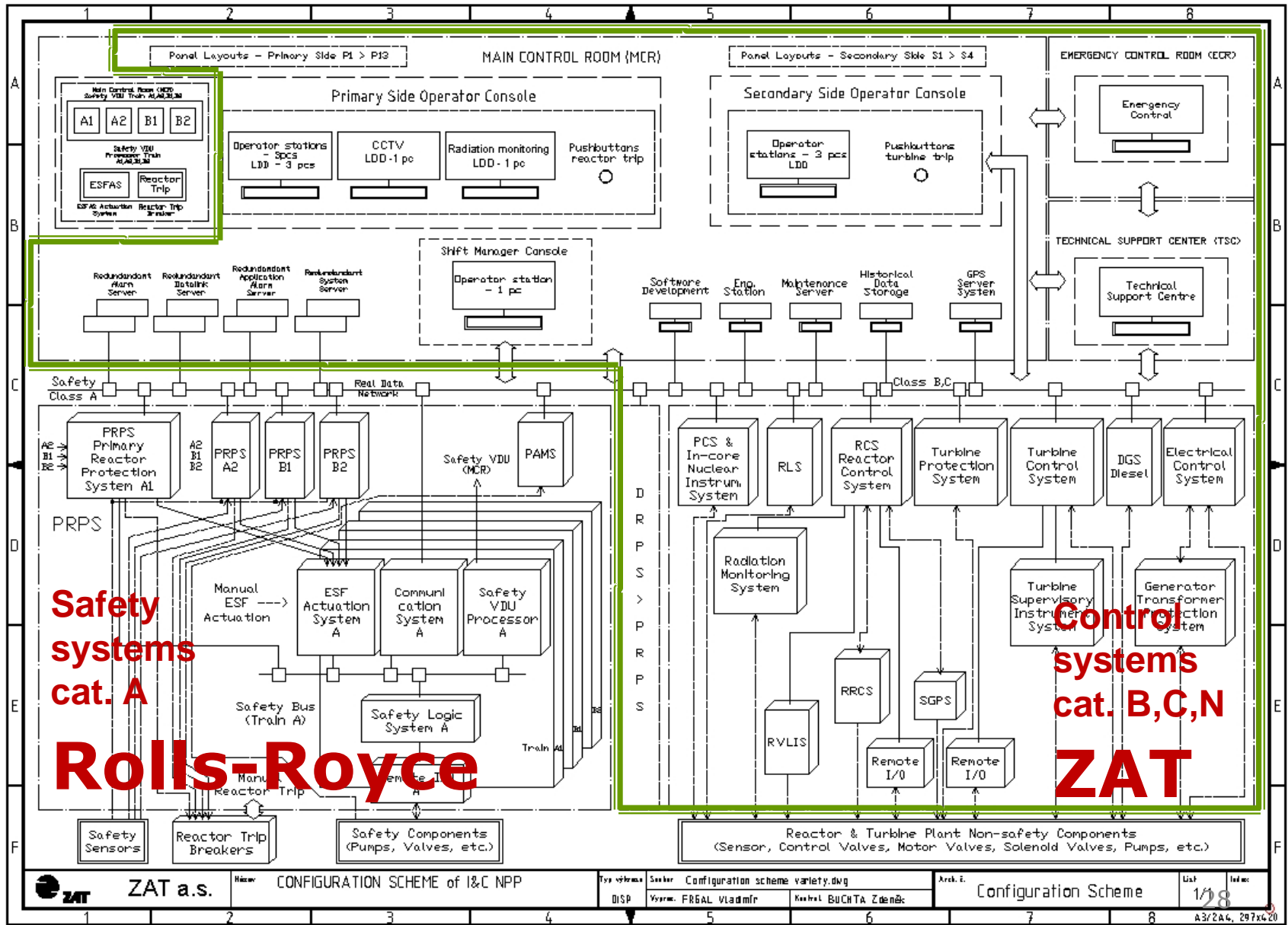
ZAT

ZAT

ZAT



NPP TEMELIN 3,4_I&C SYSTEMS RR& ZAT



Safety systems cat. A

Rolls-Royce

Control systems cat. B,C,N

ZAT

REFERENCES ZAT a.s.

- **ZAT is a company successfully operating in the field of nuclear energy since the early 80s of the 20th century**
- **ZAT supplies its products to all nuclear power plants in Czech Republic, Slovakia and Ukraine**
- **ZAT supplies I&C systems for both primary and secondary circuit**
- **ZAT is constantly expanding the number of operational systems I&C, which provides for nuclear power plants**

CONCLUSION

- **ZAT currently has all the know-how for the design, manufacture and service of most I&C systems for VVER reactors. These systems are further developed and modernized in the ZAT**
- **Experiences gained in this field use the ZAT's engineers in the design also other I&C systems of VVER reactors. The company is building a position that to enable it to apply expected development of nuclear energy**
- **ZAT is able to contribute to extending the life of existing units with VVER reactors in the I&C systems modernization of primary and secondary circuit. We have gained lot of experiences during modernization of NPP Dukovany and other projects in the field of nuclear energy**
- **ZAT company is ready to apply the latest management systems in the expected development of nuclear energy.**

Thank you for attention

