



COMPANY PROFILE

I&C Energo a.s.



COMPANY PROFILE



I&C Energo a.s.

RELIABLE PARTNERSHIP SINCE 1993

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LETTER FROM THE CHAIRMAN



Ladies and Gentlemen,

The last few years have been exceptional in certain aspects for I&C Energo and the entire company. The Covid-19 pandemic and dramatic changes in the geopolitical situation and war conflicts between states carry hitherto unknown risks and threats. Managing them is an extremely challenging task for any individual or company. It has become painfully clear that our world is not as safe and predictable as we thought it was.

Every day in the life of our company – we simultaneously implement hundreds of individual orders in various locations, including abroad. The number of our individual customers is well above a hundred every year. We have up to hundreds of employees in various locations in the Czech Republic, and we are permanently present in Slovakia and Hungary. The instability of the outside world fundamentally complicates the planning and coordination of our project teams as well as the entire operation of the company. The power plants and other industrial plants where we work cannot be switched off. Schedules of outages and investment project are fixed and define our tasks in them. The permanent task, which is the primary requirement for most of our activities, is determined by the need to ensure the uninterrupted operation and implementation of our activities in energy and industrial operations. This places unprecedented

demands on operational management, including the introduction of operational measures. With great honour and respect, I want to thank our employees for their personal responsibility and the approach with which they handle these situations.

For I&C Energo, the production and distribution of electricity is the main segment of the market. The priority of the sole shareholder of I&C Energo is the long-term approach, continuity and further development of our company's core business in all three basic products – service, investment, and engineering.

I&C Energo is one of the largest Czech suppliers of investment projects and services for various industrial applications in the field of technological process control systems and power supply systems. A significant part of our activities is also represented by machinery activities focusing on piping systems, steel structures and other technological machinery. Other standardly applied products of the company are supplies and service in the area of building technologies as it is called, including the equipment of technical protection of buildings systems or electronic fire protection systems. The company implements its supplies and engineering solutions from the position of a system integrator of major manufacturers and suppliers of control, management, information and safety technologies, components and systems.

One part of our activities includes the original concept of supplier maintenance for the Dukovany and Temelín nuclear power plants. Throughout the existence of I&C Energo, supplier maintenance has been a core element of our deliveries, although the total share of sales realized in the service has gradually decreased. However, this decrease is not due to a lower scope of implemented supplier maintenance, but on the contrary due to a significant increase in the share of our remaining products, especially the volume of investment deliveries with a high scope of our own engineering. We offer investment supplies from the processing of studies and projects, software development, system integration and system support through deliveries, installation, commissioning to the provision of a regular warranty and post-warranty service.

Another engineering area of activity is the optimization of power production plants. These are engineering superstructures, where we create our own solutions for specific power plants. For example, how to improve combustion efficiency, how to monitor the system of power transformers, we develop information systems for the management and creation of operational and technical documentation, we have developed apparatus for measuring boron concentration, etc.

Throughout its existence, I&C Energo a.s. has been a profitable company with positive trends in basic economic performance indicators. Success in tenders is a contribution to the next periods.

The current fulfillment of the concluded Framework Agreements for the maintenance, repair and inspection of equipment of electrical and I&C systems logical units at the Dukovany and Temelín nuclear power plants for the period from 2021 to 2028 brings opportunities for higher efficiency of maintenance activities, including the direct involvement of I&C Energo in the course and result of outages.

This commitment also confirms the capabilities and expertise of I&C Energo and is the result of a continuous effort to build the position of a reliable and respected supplier for the nuclear power industry.

The possibilities of obtaining supplier maintenance for new customers are already considerably limited on the Czech market, and so logically the capabilities in the area of investment deliveries and engineering have become the main aspect in expanding the customer portfolio. The original focus of I&C Energo on the service of nuclear units in operation is purposefully expanded in the area of the company's engineering and supply application in investment projects.

The organizational structure of the Company is set up to support these goals and bring the potential for our higher efficiency and effectiveness.

Key know-how is concentrated in centralized engineering, the divisions at the Dukovany and Temelín nuclear power plants are the largest capacity bases of our nuclear activities and references. The remaining part of the company organized in such a way so that we can maximally support the fulfillment of our ambitions, which we have in the non-nuclear industry, abroad, as well as for the new nuclear source in Dukovany.

Our long-term intention is to be a strong and respected supplier for our customers. The experience, references and expertise we have as a company are our competitive advantage in the search for successful business strategies in announced competitive tenderings.

The long-term and customer-reliable implementation of the service at the Dukovany and Temelín nuclear power plants represents unique know-how, which in combination with the deeply experienced nuclear culture as it is called forms the basis of our ambitions in the nuclear power industry. The basic premise of success is the ability to respond to changes that markets relevant to the Company are going through and to successfully identify new opportunities. We have many years of experience and existence in a competitive environment and a proven ability to succeed. Thanks to our performance and the strength of our ownership structure, we are able to secure operational financing. We can still win new orders and customers.

The company's management consists of a consistent team tried and tested by years of experience. Qualification, experience and project cooperation of the company's employees is then a key asset. That is why I believe that we have enough reasons to look into the next years with optimism.

Jiří Holinka, Chairman of the Board and CEO

ABOUT US

I&C Energo a.s. belongs among the largest Czech suppliers of capital projects and maintenance services for various industrial applications in the field of technological process control systems and LV, HV and EHV power supply systems. A significant part of our activities consists of so-called machine activities focused on piping systems, steel structures and other technological machinery. Other standard applied products of the company include supplies and services in the field of building technologies, including electronic security systems for buildings or electronic fire-protection systems.

The company carries out its supply and engineering solutions from the position of a system integrator of major manufacturers and suppliers of regulation, control, information and security technologies, components and systems.

It has been in the market since 1993 and its supplies and services are provided mainly in the power industry and large industrial plants, where the nuclear power industry is its principal sector.

For our Czech and foreign customers it represents a reliable partner, able to assume full responsibility from the projection stage through supply of material, realization and putting into commission as well as any subsequent service.

OUR STRATEGY

Vision – To be a leading provider of technology services and engineering solutions for selected energy and industrial operations.

Mission – To provide professional services and effective innovative solutions optimizing the technical and economic parameters of customers' industrial assets.

Shared principles

Values

Our basic priority is the creation of values.

Customer-Driven Approach – Professionalism

We always aim at the customer-driven approach

We especially see professionalism in dealing with difficult challenges, working at 100% and quickly, while preserving the aspects of safety and proper approach..

Trust and Responsibility – Order – Communication and Conduct

We trust others and delegate authority to them, and motivate and encourage them. On the contrary, we are aware of our personal responsibility for the results of the trust given.

We maintain order as the basis of prosperity in all our activities.

We support communication among all departments of the company and across all levels as well. We always act in a professional and correct manner, externally as well as internally, always in the spirit of decent conduct principles. Externally, we always act in a uniform manner in accordance with our strategy and shared principles. In connection with the established Compliance system, the company enables confidential receipt of whistleblowing. The company guarantees the protection of whistleblowers.

Changes

We support changes that we perceive as an opportunity for further development and not as a cause for concern or a threat.

I&C Energo a.s.

Sole stockholder (100%): PI 1 a.s.

Pařížská130/26, Josefov, 110 00 Praha 1
Czech Republic

Statutory bodies: Jiří Holinka, Chairman of the Board of Directors
Štefan Okruhlica, Vice-Chairman of the Board of Directors
Jan Honek, Member of the Board of Directors

Year of inception: 1993

Legal form: joint-stock company

Company identification: Company Registration No.: 49433431
Tax Identification No.: CZ49433431

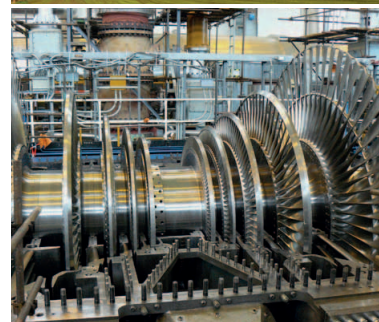
Trade Connections: P +420 568 413 111
F +420 568 413 999
E obchod@ic-energo.eu
www.ic-energo.com



Seat of the company: Pražská 684/49
674 01 Třebíč
Czech Republic

The company is incorporated in the Commercial Register held by the Regional Court in Brno, Section B, File No. 4153.

Leading supplier of comprehensive services
in the area of command and control,
industrial information systems, electrical systems
and engineering activities
with a strong history in the nuclear power sector.



I&C Energo a.s.

Board of Directors

As the statutory body, the Board of Directors manages the company's operations and acts in its name. It decides in matters relating to the company's commercial management. In certain matters, it may only decide with the prior consent of the Supervisory Board. The powers and responsibilities of the Board of Directors are defined in the Articles of Association.



Jiří Holinka

Chief Executive Officer
Chairman of the Board of Directors



Štefan Okruhlica

Director of Capital Project Division
Vice Chairman of the Board of Directors

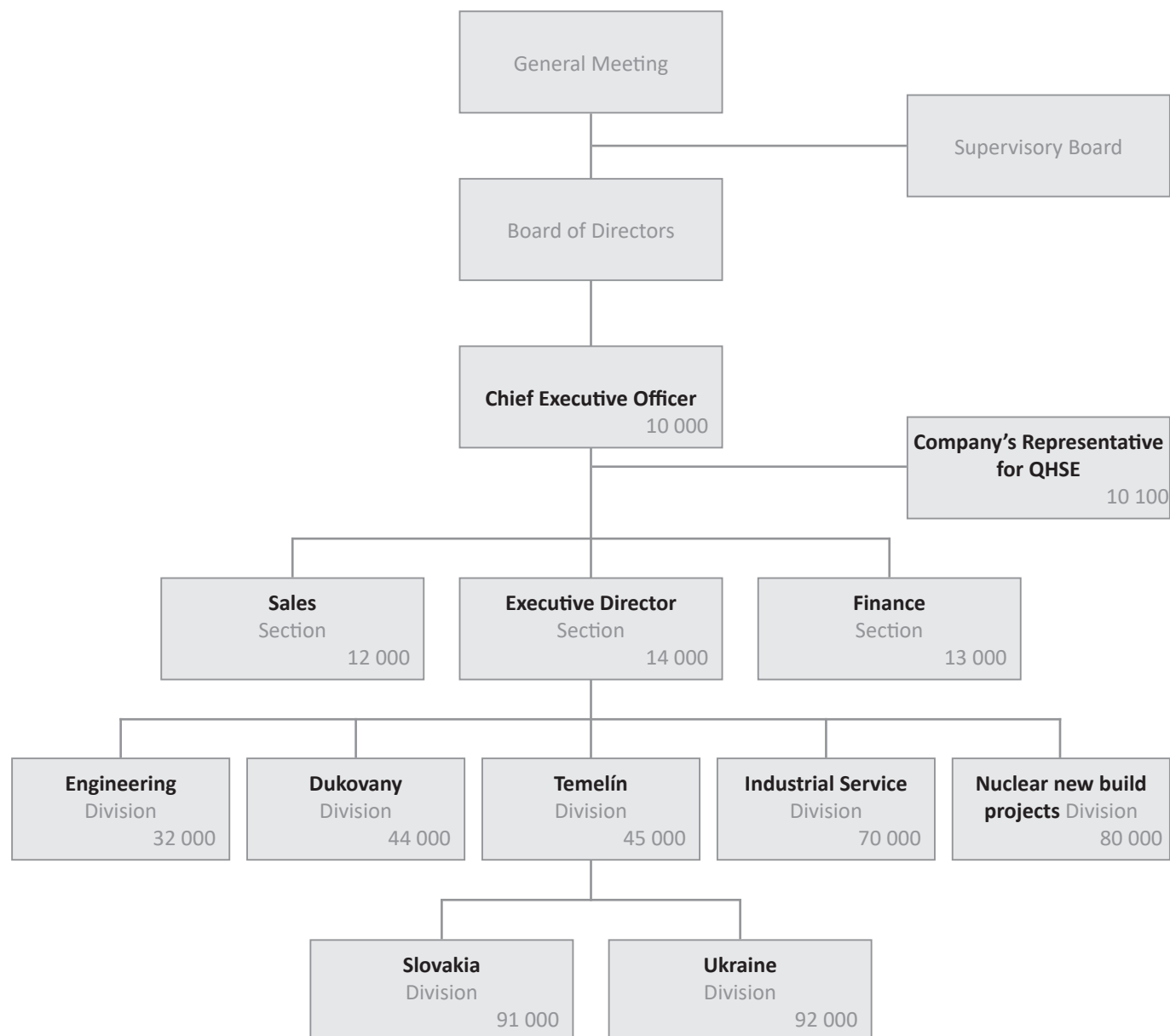


Jan Honek

Member of the Board of Directors

I&C Energo a.s.

Organization Chart



I&C Energo a.s.

I&C Energo a.s., the parent company, is internally organized in executive divisions and (central) sections. The sections are called Headquarters. The divisions provide services to external customers from the Company's product portfolio, which means they are responsible for the contract implementation.



Management of the company I&C Energo a.s. – from left: Vladimír Kosmák, Jiří Kropáček, Roman Musil, Jiří Holinka, Jan Krška, Bořivoj Hejzlar, Štefan Okruhlica.

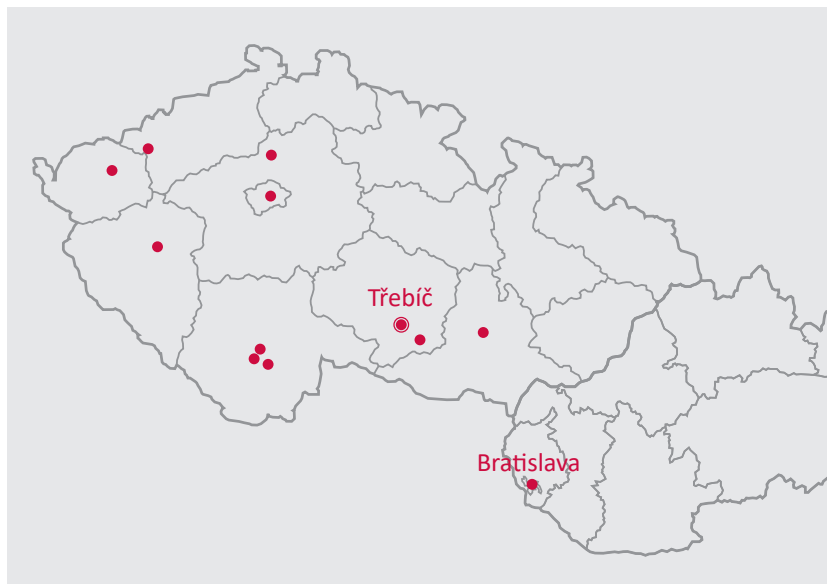
I&C Energo a.s.

Locations I&C Energo

I&C Energo a.s. is represented by branches in 11 locations in the Czech Republic and one organizational unit in Slovakia.

I&C Energo a.s. branches

Třebíč, České Budějovice, Praha, Brno, Dukovany NPP, Temelín NPP, Klášterec nad Ohří, Plzeň, Karlovy Vary, Mělník Power Station, Týn nad Vltavou, Bratislava.

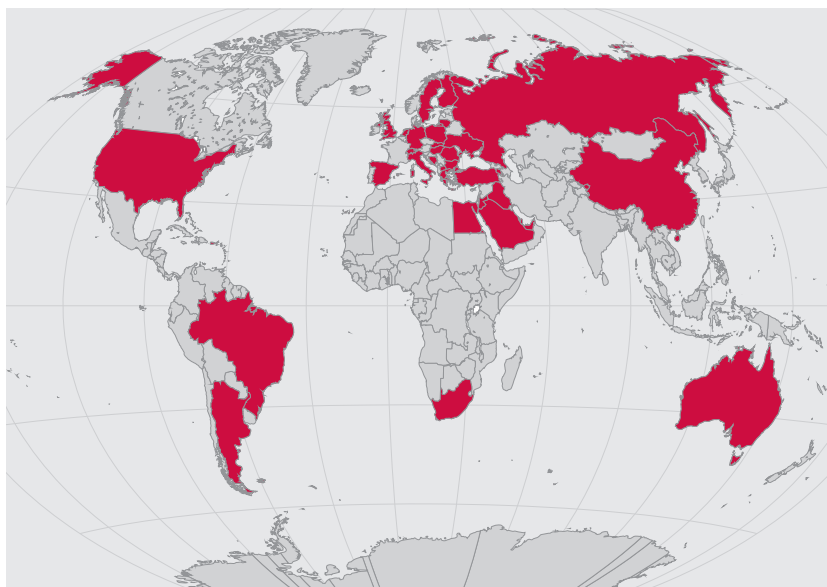


Projects Abroad

Recently, I&C Energo a.s. has been mainly implementing projects abroad in the field of nuclear energy in the region of Europe. However, the overall list of countries where I&C Energo a.s. has delivered its services now extends to nearly thirty countries, and apart from Europe, includes Asia, North and South America, and Africa.

Country list

Argentina, Armenia, Australia, Bosnia and Herzegovina, Brazil, Bulgaria, China, Egypt, Finland, Iraq, Italy, South Africa, Jordan, Qatar, Lithuania, Hungary, Macedonia, Germany, Netherlands, Poland, Romania, Russia, Greece, Saudi Arabia, United Arab Emirates, Slovakia, Spain, Sweden, Switzerland, Turkey, Ukraine, USA, United Kingdom.



PRODUCT PORTFOLIO

KEY MARKET SEGMENTS

Nuclear and conventional power plants

District heating, energy distribution

Other industries (water industry, mining industry, telecommunications)

KEY PRODUCTS

CAPITAL INVESTMENT PROJECTS

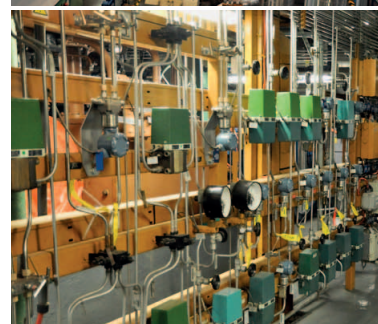
Complex projects, deliveries and subcontract management in the field of industrial automation (field instrumentation, control, safety, information and dispatching systems), electrical systems – high-current and low-current equipment and technical operation of buildings. Investment deliveries also include piping systems including valves, steel structures and other mechanical activities.

ENGINEERING

Engineering is a key part of the product portfolio of I&C Energo a.s. Its mission is to ensure the professional engineering activities necessary for the successful implementation of the contracts for the company's customers. These activities include in particular pre-project preparation, designing, implementation support, including project management, completion of design documentation, project data management or software development, and activities necessary for putting the technological unit into full operation.

SERVICE

Servicing in the field of automatic technological process control systems and electrical equipment (I&C and Elektro) for industrial applications, servicing of technical building protection systems, servicing of machinery and terminal equipment.



CAPITAL INVESTMENT PROJECTS

I&C Energo a.s. supplies comprehensive instrumentation and control systems, industrial automation, and electrical systems – from drawing up studies and project documentation, software development, system integration and system support, through supplying, assembling, and commissioning, to regular warranty and post-warranty servicing.

Long term experience in the implementation of investment projects in the form of final supplies and the development of project management capabilities has enabled I&C Energo a.s. to position itself as a final supplier for investment units.

The company places great emphasis on familiarizing itself with the specific environment and needs of every client. This in turn allows us to take an individualized approach to determining optimum project technical modifications with a focus on minimizing both investment and operating costs.

In our efforts to satisfy our customers and build strong mutual partnerships, we also offer financing for capital investment projects undertaken by I&C Energo a.s., in line with the subject matter of the project, the customer's needs, and the agreed terms and conditions. The company's core market sector is that of electricity and heat generation and transmission.

With facilities at multiple sites in the Czech Republic, I&C Energo a.s. is able to efficiently manage the implementation of capital investment projects – installation & assembly teams operate through facilities in the service divisions while engineering teams provide specialized technical support.

Our close cooperation with major suppliers of technologies has attracted international business to the company.

Scope of capital investment projects

The range of the company's capital investment projects is very extensive. It encompasses complete engineering design, sourcing, management of construction and technology subcontractors, installation & assembly, commissioning, as well as warranty and post-warranty servicing.



CAPITAL INVESTMENT PROJECTS

I&C Energo ensures supplies related to Instrumentation & Control Systems (I&C) and Electrical Systems:

- industrial automation;
- field instrumentation;
- regulatory, control, security, and information systems;
- grid and generation control systems;
- electrical systems – high and low voltage equipment;
- extra high-voltage (EHV) substations;
- high-voltage (HV) substations, transmission lines, and distribution systems;
- low-voltage (LV) substations, distributors, and distribution systems;
- EHV/HV/LV transformer stations;
- diesel generators, UPS, direct current power supply units and distribution systems;
- breakers, line isolators, protection, motor installations, servo motors, electrical appliances;
- outdoor and indoor lighting, lightning protection, grounding systems;
- cables (including optic fibres), fire barriers, grounding systems, lightning conductors.

I&C Energo a.s. also supplies building operation technologies and systems, such as:

- optical data transfer, structured cable systems;
- electronic fire alarms;
- closed circuit television;
- access control and time clock systems;
- audio systems, intercom systems, internal communication;
- telephony, radio, unified time systems.

I&C Energo ensures supplies related to mechanical activities:

- design of pipework systems and parts thereof;
- calculations for pipework systems, pipe components, and steel structures;
- consulting services, technical support and advice in the field of pipework systems;
- supply of pipework systems, load-bearing structures;
- supplementation of I&C circuits with machine components;
- inspections and repairs of pipe components, accessories and fittings;
- reconstruction and repair of dedicated pressure and gas equipment;
- servicing and maintenance including the adjustment of accessories and the placement of pipework systems.

ENGINEERING

Engineering is a key part of the product portfolio of I&C Energo a.s. Its mission is to ensure the professional engineering activities necessary for the successful implementation of the contracts for the company's customers. These activities include in particular pre-project preparation, designing, implementation support, including project management, completion of design documentation, project data management or software development, and activities necessary for putting the technological unit into full operation.

An important part of the Engineering product is also the implementation of complex IT projects in the field of software support for large technological units, large-scale optimization projects, and also the supply or maintenance of special measuring instrumentation. Services provided in the field of software support for large technological units include project data management aimed at ensuring a consolidated and valid database – single source of truth, digital twin, BIM/PIM, etc.

In our work, we apply the knowledge of technological equipment, technological processes and business processes of our customers in combination with sophisticated analyses, advanced data processing and software engineering.

In order to implement our services and supplies, we have developed a number of methods and tools and acquired advanced technologies and third-party tools. Within the scope of our deliveries, we co-operate with leading Czech and foreign producers and suppliers of software, equipment or systems, suppliers of engineering services as well as technical universities and other research institutes. We deliver extensive and comprehensive solutions with a high engineering added value based on long-term and systematic technical development.

Activities and Applications

PROCESS ENGINEERING

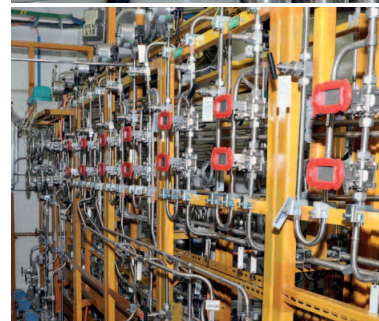
We deliver comprehensive solutions for the optimization of technological processes.

Services (supplies) provided in the fields:

Optimization of thermal cycle

Delivery and implementation of the PowerOPTI monitoring and optimization system. Key functions are based on statistical processing of measured data and mathematical and physical modelling:

- Data validation – detection, identification and elimination of gross measurement errors; increased accuracy, correctness and reliability of measurement of operating quantities; recalculation of values of not measured quantities, including their accuracy



ENGINEERING

- Statistical evaluation of large sets of measured data, extraction of maximum useful information about the behaviour and performance of equipment and technological process (Data Mining)
- Simulation and optimization of processes – determination of achievable or expected values of quantities and performance parameters for the given boundary conditions, which then represent the standard for evaluation, diagnostics and optimization of the performance of equipment and technological process
- Consultancy, advisory service, analyses
- Methodological and software support for creating energy balances

Combustion optimization

A set of methods, procedures, instrumentation and (software) tools designed to optimize the combustion process of solid fuel boilers

- Measurement
 - Measurement of temperature fields in the combustion chamber of the boiler (high-temperature cameras)
 - Delivery of pyrometry system for measuring temperature and absorption coefficient
 - Delivery of spectrometry system for measuring temperatures, emissivity, NOx emissions and temperature dispersion for the purposes of combustion optimization
 - Other special measurements (flue gas analysis, velocity and volume flow rate in powder lines, ON-LINE analysis of grinding roughness of powder mills, ...)
- Modelling – modelling and calculations in the ANSYS Fluent program (CFD – Computational Fluid Dynamics program enabling comprehensive solutions to problems in the field of flow, heat transfer and combustion)
- Optimization of economic and environmental parameters of boiler operation; achieving maximum efficiency of energy conversion, reduction of NOx and CO emissions
- Implementation – designing, delivery and assembly within comprehensive optimization projects

Engineering simulators

- Development of engineering simulators (Dukovany nuclear power plant, Temelín nuclear power plant, Mochovce nuclear power plant, Počerady combined cycle power plant; own platform for simulation of dynamic systems and creation of engineering simulators)
- Analyses of operating conditions (dynamic behaviour / transient processes) of power plant units by means of engineering simulators (under nominal and fault conditions; in changing technology parameters, regulators and protections; ...)

Asset maintenance process management

- Delivery of comprehensive services (process and data analyses, localization, customization, implementation, support, upgrade, data migration, integration with other applications)
- Partnership with Hitachi ABB Power Grids in the field of Asset Suite – standard software solution among EAM systems, including the following functionalities: Work and Asset Management, Supply Chain Management, Operations Management, Safety and Compliance Management

ENGINEERING

Boron Concentration Measurement System (AMKB)

Production, delivery and installation of AMKB (boron meters) to increase the safety of nuclear power plants (NPP), in particular during outages and during changes in operating conditions

- The measurement system, which consists of instruments and devices designed for measuring the concentration of isotope ^{10}B and the concentration of boric acid H_3BO_3 in NPP technology, supplemented by methods to ensure metrology continuity
- Types of devices:
 - Calibration boron meter – it is designed for determining the concentration of isotope ^{10}B or boric acid H_3BO_3 in g/kg and the atomic representation of isotope ^{10}B in % (adjustment and calibration of service boron meters, input control of H_3BO_3 at NPP, unknown solutions taken from the technology) with high accuracy
 - Service boron meters – they are designed for continuous measurement of the content (concentration) of the isotope ^{10}B of boron or boric acid H_3BO_3 in g/kg.

Depending on the location in the technology, they are manufactured in the following versions: Flow, Suspension and Submersible

Certification of transmission system support services (according to the Code).

INDUSTRIAL AUTOMATION

We are a supplier of comprehensive solutions for the field of control, safety and supervisory systems (SCADA) or distributed control systems (DCS), including the creation of software for these systems. Projects for special field instrumentation for technology monitoring are also an integral part. We are also able to deliver our services in accordance with current legislation in the field of cybersecurity.

Design activities are mainly focused on the segment:

- Power engineering
- Industrial operations
- Other buildings and operations

Provided services

- Compilation of design documentation of all stages
- Feasibility study, cooperation on investment projects
- Basic Design
- Detail Design
- As-built documentation
- Documentation falling under the building permit process (e.g. documentation for the building permit, documentation for construction, ...)
- Processing of technological algorithms and software for PLC
- Visualization of technological processes
- Development of software for control and safety systems, including follow-up communications
- Verification and validation of control and safety systems software
- Cybersecurity services for OT (Operational Technology)

ENGINEERING

Other engineering services:

- Author supervision
- Participation in the processing of supporting technical documentation for the implementation of the work (equipment test programs, operating regulations, maintenance instructions, etc.)
- Consulting and advisory services

Designed facilities

- Process instrumentation
- Control systems (PLC/DCS)
- Safety systems
- Carrier cable systems and cable route systems (conventional modular routes or routes with fire integrity; design including auxiliary structures, control of mechanical load or occupancy of trays)
- Data, communication and control cabling systems (design of conventional or fire-resistant cabling, including routing and accessories)
- Smart building projects (including comprehensive electrical solution – i.e. all distribution systems up to the LV level)

INFORMATION SYSTEMS

We are a supplier of comprehensive software solutions for the operation of large technological units, in particular in the field of Asset Management, Information and Configuration Management, Document Management, Management of Chemical Laboratories and in the field of historization, visualization and processing of technological data. We cover the entire life cycle of IT solution delivery from analysis and project processing, through development, data processing, implementation and integration to servicing of our solutions.

Provided services (deliveries)

- Development of comprehensive information systems
- Implementation of technological data warehouses and SCADA systems
- Implementation of engineering data warehouses and documentation
- Engineering data processing, including creation of a digital information model of the technological unit
- Implementation and modification of customized software solutions
- Integration of information systems
- Design and implementation of complex IT infrastructure (communication, networks, security, virtualisation, etc.)

Partnership with AVEVA (Information Management and Wonderware and OSIsoft product lines):

- Implementation of the AVEVA portfolio in the field of Information Management (AVEVA NET solution)
- Implementation of the AVEVA portfolio in the field of Monitoring and Control for the collection, visualization and processing of technological data and for the management and optimization of operations (Wonderware product line)
- Implementation of the OSIsoft product line, the PI system platform, for the monitoring of production technologies, storage of process data and their easy use for analyses and optimization of production, operation and maintenance at all levels of the company from the control centre to management
- Advanced configuration, integration and customization of these solutions

ENGINEERING

PROJECT DATA MANAGEMENT

We are mainly engaged in activities in the fields of system (database) design support and system (database) support for the implementation and management of complex projects.

Provided services

Deployment and operation of the Cabling Management System (SSK)

- SSK is a specialized CAD/CAE system developed and deployed by I&C Energo a.s., designed to support the designing, implementation and operation of cable systems of large technological units. I&C Energo uses the SSK system within the implementation of its own investment delivery projects and provides the rights to use the system to external entities, either directly or as part of comprehensive cable system management services.

Operation of the Bentley AXSYS.Engine system – tool for 2D database-oriented designing

- We use the Bentley AXSYS.Engine system to compile design documentation within the implementation of our own investment delivery projects and we also provide these services to external entities (e.g. ČEZ, Dukovany nuclear power plant).

Consolidation and validation of technical data

- Thanks to our knowledge and experience in the field of database designing and the capacities to develop specialized software systems, we offer a comprehensive solution to the given problem, from mapping and analysis of available data sources (drawings, tables, databases, photo documentation, ...), through the design of the logical model of the processed part of the technological unit, the design of the database and data consolidation and validation algorithms to the automatic or automated execution of consolidation and validation operations.

Comprehensive provision of system support for project implementation and management

- This includes in particular a proposal for a methodological solution and/or development of specialized software tools, aimed at optimizing and streamlining the activities related to the implementation and management of complex projects. These activities include comprehensive support from the identification of project requirements and needs, through their analysis, proposal for a solution and implementation to deployment, maintenance and provision of related methodological and technical support to internal and external users.

TESTING AND COMMISSIONING

We focus in particular on the management and support of project implementation, including implementation of activities during the commissioning of technological equipment (tests and commissioning).

Provided services

- Project management of the commissioning of technological units and production operations (Project Management and Construction Management)
- Preparation of supporting technical documentation for project implementation, such as construction organization plans, technological and work procedures, operating regulations, instructions for operation and maintenance, PTD (accompanying technical documentation), schedules, etc.
- Preparation of testing documentation, test programs such as inspection and test plan, loop tests, individual testing, pre-complex and complex testing plan, etc.

ENGINEERING

- Implementation of inspection activities as part of procurement (FAT tests), ensuring technical inspection of implementation and commissioning, creation of reports, completion of accompanying technical documentation
- Commissioning of technological units, or their parts – support and implementation of programs such as IT (Individual Test), SAT (Site Acceptance Test), ICT (Interconnected Test), CT (Complex Test), GT (Guarantee Test), to verify the design parameters of equipment after its installation and recovery
- Use of the application of Cabling Management System (SSK) tools and the application of the Smart Path Finder (SPF*) system to define the alarm structure of the tested system and its links to other technological units.
- Cable condition diagnostics (reflectometry – metallic, optical)
- Inspection of electrical equipment (HV, LV, inspection of the loads)

* SPF is a database tool for tracing signals and signal paths from source to destination and is capable of providing a list of total signal path trees. This tool is mainly used in loop tests.

ELECTRICAL SYSTEMS

We focus on heavy-current electrical systems:

- In power plants, electrical stations up to 110 kV
- Industrial facilities
- Building electrical installations – in industrial facilities and in administrative buildings

Provided services

- Compilation of design documentation of all stages
- Studies (including calculation of financial costs, calculations of short-circuit ratios)
- Basic design
- Detail design
- As-Built documentation
- Documentation falling under the building permit process (e.g. documentation for building permit, documentation for construction, ...)

Other engineering services:

- Author supervision
- Consulting and advisory services
- Network calculations (short-circuit ratios, voltage ratios, power balances, ...)

Designed facilities

- VHV substations 110kV (power part from the input portal, relevant control circuits, protection, construction part subcontracted)
- HV substations – primary and secondary distribution of 6 kV, 10.5 kV for power plant on-site consumption or industrial operations. Secondary distribution 22 kV for industrial operations. Design of the power, control and management part including protections

ENGINEERING

- Power transformers, distribution transformers – primary and secondary distribution of power plant on-site consumption, industrial operations
- LV substations – conventional main and secondary cabinets up to 5000 A for distribution; modular switchboards up to 2500 A; design of the power and control parts
- Sources of emergency power supply – diesel generators, rectifiers, inverters, UPS, station batteries; network topology design, including source dimensioning for steady and transient conditions
- Cable systems – LV and HV cabling; design of conventional or fire-resistant cabling, including routing and accessories
- Cable route systems – conventional modular routes or routes with fire integrity; design including auxiliary structures, control of mechanical load or occupancy of trays

MECHANICAL ENGINEERING

We focus on pipe systems, including auxiliary steel structures, for thermal power plants, nuclear power plants, heating plants or energy centres, as well as other industrial facilities.

Provided services

- Compilation of design documentation of all stages
- Study (including calculation of financial costs)
- Basic designs (for smaller contracts)
- Detail design
- As-Built documentation

Other engineering services:

- Author supervision
- Consulting and advisory services
- Provision of special maintenance work on measuring instruments
- Plotting technology into the BIM model (building information model)
- Design documentation for SHZ (stable fire extinguishing equipment)
- Processing of 3D models in SW PDMS and E3D, including 3D models from Laserscan documents

Designed facilities

- Heat exchanger stations
- Piping
- Steel supporting structures for piping
- Stable fire extinguishing installations
- Steel structures (platforms, pipe / power bridges, supporting structures)
- Projects for industrial facilities in the BIM model (in particular, technological piping systems, supporting and service structures, plotting MaR equipment and electrical professions, ...)

SERVICE

I&C Energo a.s. is one of the largest Czech suppliers of comprehensive services in the area of control systems and LV, HV and EHV electrical equipment for various industrial applications, including system integration and support. Our comprehensive services also include servicing of protective systems in buildings, including electronic fire protection systems, as well as servicing of equipment in non-industrial buildings.

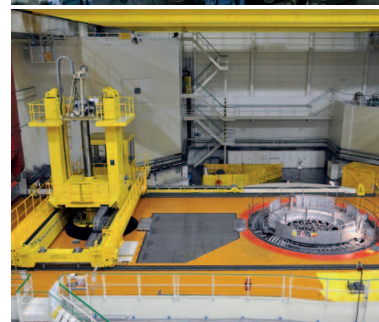
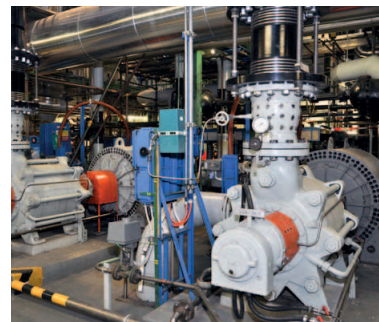
To our customers, we are a reliable partner capable of taking full responsibility for the technical, organizational, and logistical aspects of outsourced maintenance and servicing, as well as for their economic effectiveness.

Outsourcing these activities allows customers to focus on making strategic decisions in their core business.

I&C Energo is a long-term provider of outsourced maintenance for the ČEZ Group's nuclear and conventional power stations as well as for other customers.

Service include:

- Outsourced maintenance of regulation, control, measuring, security, information, and other systems in power and other industries;
- comprehensive planned, random and predictive maintenance, routine repairs, overhauls, checks, inspections, rebuilds, and upgrades, including providing spare parts and technical support for I&C systems, industrial information systems, electronic systems for buildings and electric power systems;
- the creation of annual and mid-term plans for periodic maintenance;
- servicing of protective systems in buildings – including both routine and as-needed maintenance;
- measurement of emissions, other measurement services;
- Implementation and synergy of selected diagnostic measuring on ASMTTP equipment and LV, HV and EHV electric equipment.



SPECIALIZED PRODUCTS

I&C Energo a.s. provides specialized products within its three main product areas.

OSIsoft PI System – It enables easy monitoring, control or management of production and operational technologies, storage of process data and their easy use for analysis and optimization of production, operation and maintenance at all levels of the company from dispatching to management.

LTO Suite – Comprehensive information system to support the management of ageing technological systems (Long Term Operation). LTO Suite provides tools for the storage, administration and in particular evaluation of operating and diagnostic data related to specific types of equipment. (Among other things the timely prediction of equipment failures and the identification of the causes.)

BORON METER – Equipment for measuring Boron concentrations – measuring system consisting of instruments and other components intended for boron isotope ^{10}B and boric acid H_3BO_3 concentration measurement in nuclear power plant technology.

CombustionOPTI – set of methods, instrumentation and software tools designed to optimize solid fuel combustion boilers (their economic and environmental parameters).

PowerOPTI – A set of interconnected methods, procedures and software tools for the monitoring, evaluation, control, diagnosis, and optimization of operations (thermal cycling) of power plants and heating plants.

TRAMON – Power transformer monitoring system for transformer life-time management and for increasing transformer safety and reliability. System implementation reduces the risk of transformer failure and related direct and indirect damage.

ADICOS – A system of early warning against starting (smouldering) fire which minimizes damage in case of its occurrence. The system is very sensitive and can detect fire much earlier than conventional fire alarm systems (EPS). It is primarily designed for coal handling systems and fuel storage sites, but can also be deployed in other areas where flammable materials are transported or stored and the risk of fire exists.

ENGINEERING SIMULATORS – Software tools and related services for the monitoring, evaluation and optimization of transient processes taking place in power plants in case of nominal and fault conditions or in changes of technology, controller and protection parameters. The tools are based on their own platform to simulate dynamic systems and create engineering simulators.

Granulometry – Powder mixture roughness sensor – information on particle size distribution (granulometry) and the amount of flowing particles in individual mill circuits of powder boilers, powder pipelines or pneumatic transport routes.



SPECIALIZED PRODUCTS

AVEVA Information Management – Systematic and up-to-date records of engineering data in the form of structured alphanumeric data, 2D and 3D drawings, diagrams, technical and other documents. It describes the state of the technological unit in the form of a digital model (BIM model). It is accessible to all employees and surrounding systems in AVEVA software.

GOMS – Software solution for production units in the power industry for the purpose of effective planning and implementation of shutdown and non-shutdown maintenance works and other operational activities and their ensuring. It supports the process-oriented distribution of work among the individual working groups maintaining the technological unit.

PREV-DOK – A system to ensure a user-friendly and efficient environment for the implementation of a common agenda related to the creation, registration and administration of operational documents and other technological documentation.

BIM – Building Information Modeling. Data model representing a physical and functional object (building) with its characteristics. The model serves as a database of information about the object for its design, construction and operation during its life cycle, i.e. from the initial concept to the removal of the building.

Project implementation – It covers the entire project life cycle from concept to warranty operation. Comprehensive system support for project management and implementation using the advanced SPP system, experienced and certified project managers with IPMA level B and C certification, highly qualified engineering capacities in the field of I&C, ELECTRICAL SYSTEM and MACHINERY, experienced construction managers and implementation staff, teams ensuring the testing and commissioning of the work.

Inspections and tests of electrical equipment – Inspections and tests of electrical equipment. An activity during which the state of electrical equipment from the point of view of its safety is ascertained by inspection, measurement and testing.

Cabling status diagnostics – A comprehensive solution to diagnose the state of cabling. Diagnosing all common types of cables, large measuring range from 50V up to 5kV, measurement of all cable cross-section sizes, high accuracy due to repeated measurements, simple and clear evaluation, comprehensive solutions for small and large networks, cabling length up to 30 km.

Solution for mass non-contact measurement of body temperature – non-contact measurement with display of the current body temperature, wide range with multi-person measurement, immediate alarm notification of raised temperature, automatic early warning, retrospective evaluation of data, comprehensive solutions for factories, institutions, offices, hospitals and other companies with an increased frequency of people.



SPECIALIZED PRODUCTS

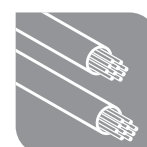
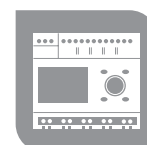
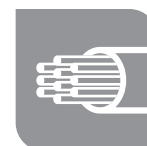
Cable Management System SSK is a specialized CAD / CAE system to support the design, implementation and operation of cable systems of large technological systems.

AVEVA Monitoring and Control – Production monitoring, control and optimization systems enable easy monitoring and control of production technologies, including analyses and subsequent optimization of production and maintenance. They make production information available at all levels of the company, from the control room to management.

RegMan – Systematic management of basic technological registers of large engineering units, which takes place at the border between design and operation. One place for processing data from designs and, at the same time, a unified source of this data for software systems supporting the operation of the technological unit.

Optical and Metallic Networks – Installation of optical communication in technological units, installation of metallic data networks, installation of plastic infrastructure (microtube distribution), blowing of cables / microtubes into HDPE pipes, termination of optical/metallic cables, measurement with certification instruments, comprehensive delivery of data infrastructure – design, installation, servicing.

Blowers – are intended for suction of air or aggressive gases and their subsequent transport. Transport of gases is free of oil. The aggregates are intended for nuclear power plants and used in various technologies (gas conditioning systems – radiation monitor, ...).



AEO CERTIFICATE

The investment downturn on our primary market in the Czech Republic means that we have to develop our capabilities to work abroad. A good foundation for us is a list of thirty countries where we already have successful references.

Recently our company has taken several system steps to support our foreign operations. One of them, brought about by the requirements of our customers, was our decision to obtain the “Authorized Economic Operation” certificate (AEO) to support our export activities.

On 11 December 2015 the Customs Office for South Bohemia, based in České Budějovice, issued the “Decision to Issue the Authorized Economic Operator Certificate (AEOF)”, with effect from 29 December 2015.

AEOF – AUTHORIZED ECONOMIC OPERATOR – FULL

It is a combination of the Customs Simplifications and Security certificates. The certificate is valid in all EU Member States. The Simplifications section will be recognized by the respective Member State in which the economic operator submits the simplification request. The “Security” section is recognized by all Member States without any limitation.

INTEGRATED MANAGEMENT SYSTEM

The integrated management system of I&C Energo is created and constantly developed in accordance with the requirements of internationally accepted standards and the requirements of the relevant interested parties of the Company. The integrated management system of the company is monitored, assessed and improved internally on a continuous basis with a view to achieving the sustainable development of the company. It is also audited regularly by our important customers, in particular by: ČEZ, a.s., ŠKODA JS a.s., Slovenské elektrárne, a.s., Energoatom Ukraine and other independent certification organizations.

The requirements of the Atomic Act No. 263/2016 Coll. are implemented in the Integrated Management System and Decree No. 408/2016 Coll., on management system requirements. The principles of the Safety Culture are established and evaluated.

In order to ensure significant deliveries, in particular for the nuclear area, international principles regarding Counterfeit, Fraudulent, and Suspect Items (CFSI) apply in accordance with the CFSI Policy.

Current certificates and other additional information about the company's products are available at www.ic-energo.com.

Quality Management System and Process Control

I&C Energo a.s. holds ISO 9001:2016 certification in accordance with ČSN (Czech technical standard) EN. The last recertification audit was performed in January 2020 by BUREAU VERITAS CERTIFICATION CZ, s.r.o. The Quality Management System was certified in 1999. The system is based on legislative requirements and respects the needs of customers and all the relevant interested parties.

The quality of the applied integrated management system in I&C Energo a.s. is demonstrated to the customers via key processes of the company's management system which it provides to its product groups: Capital projects, Engineering, Services.

Based on the company's strategic decisions, the system is built, maintained, and improved to keep pace with changes in the company's needs, objectives, products, process definitions, and organization structure. Design, production and delivery of equipment for boron concentration measurement and other special instrumentation are an integral part of the key processes.

Special processes, in particular welding, are under constant supervision within the framework of certification by the Czech Welding Institute and our customers are guaranteed compliance with the requirements of the European harmonized technical standard ČSN EN ISO 3834-2:2006 and also for the welding of class 2 thermoplastics.

A system for the management of structural steel parts, components, assemblies and structures up to class EXC4 pursuant to the European standard EN 1090-2+A1 is established and the system is regularly reviewed by the Technical and Test Institute for Construction Prague.

Protection of the Environment – Environmental Management System

Protection of the environment is a necessity and a key I&C Energo priority. This is demonstrated by thorough compliance with the requirements of our Environmental Management System (EMS), which is certified by the certification authority BUREAU VERITAS CERTIFICATION CZ, s.r.o. to comply with ČSN EN ISO 14001:2016. In 2006, the EMS was integrated with the Quality Management System.

The environmental policy of I&C Energo a.s. is set forth in the Quality and Environmental Policy, which declares I&C Energo's fundamental pledges relating to the environment, including:

- Consideration for the environment. All Company activities are carried out with consideration for the environment and

INTEGRATED MANAGEMENT SYSTEM

sustainable development and are continuously subjected to review to determine and minimize their environmental impacts.

- Compliance with all applicable environmental protection regulations, statutory and otherwise.
- Actively influencing employees and business partners.

The company encourages its employees to be more aware of their responsibility for the state of the environment and creates conditions that encourage environmentally friendly behaviour; it also mandates this approach from its suppliers.

Occupational Safety and Health (OSH) – OSH Management System

An integral part of the integrated management system is occupational safety and health management, which contributes to the fulfillment of legislative and other requirements, minimizes the risk of damage to employee health, and improves work conditions. In 2009, the OSH management system was successfully certified for compliance with the ČSN OHSAS 18001 standard by the certification authority BUREAU VERITAS CZECH REPUBLIC, s.r.o. and became a part of the integrated management system. In January 2020, the safety and health management system was recertified in accordance with the requirements of the international standard ČSN ISO 45001.

The OSH Policy is linked with the other quality policies and declares the company's fundamental pledges in relation to occupational safety and health. These pledges are:

- To give safety and health equal priority with economic, operational, and other concerns.
- All company activities are carried out with regard to protecting human health (employees and the general public), as well as protecting the environment and property, and are subject to continual review to determine and minimize the impacts on employee and public health.
- To respect statutory and other applicable OSH regulations.
- To develop awareness on the part of employees and suppliers of the need to protect their own health and to cooperate with us in continually improving the level of OSH.

Information security management system

Since 2015, the Information Security Management System has been gradually implemented into the integrated management system according to the requirements of ČSN EN ISO / IEC 27001: 2014. The Information Security Policy is announced, the goals, principles of information security are set, and a regular review of the system is carried out.

In 2016, the Information Security Management System was certified for the first time by the certification body BUREAU VERITAS CERTIFICATION CZ, s r.o. for design and engineering activities, comprehensive implementation, maintenance and servicing of technical protection systems and electrical fire alarm systems, including database modifications. In June 2022, recertification confirmed the implementation of the information security management system into the Integrated Management System for the entire scope of the company's activities.

ENGINEERING, DESIGN, SOFTWARE DEVELOPMENT, SUPPLY, REFURBISHMENT, UPGRADING AND MAINTENANCE, INCLUDING MACHINERY AND CONSTRUCTION ASSEMBLY & INSTALLATION OF TECHNOLOGICAL SYSTEMS AND EQUIPMENT, ELECTRIC SYSTEMS, POWER LINES, INSTRUMENTATION AND CONTROL SYSTEMS, SECURITY SYSTEMS AND INFORMATION SYSTEMS. DESIGN, PRODUCTION AND SUPPLY OF EQUIPMENT FOR MEASURING OF THE BORON CONCENTRATION AND OTHER SPECIAL INSTRUMENTS.

INTEGRATED MANAGEMENT SYSTEM

Compliance

The company is aware of its responsibility as important entity in the market and therefore it has decided to pay special attention to the field of compliance with the law and respect for good morals and public order.

The company is committed to implementing effective measures to increase the standard of compliance with the law and respect for good morals and public order, as well as to monitor continuously their functionality, and to lead its employees to their consistent application and enforcement.

The company has introduced the Compliance system and issued the Compliance Manual as the main measure to ensure compliance with the law and respect for good morals and public order in all activities.

The practical application of the processes and principles mentioned in the Manual will be regularly monitored, evaluated and enforced within the Company, and all the members of the Company's bodies will set up an example for their workmates.

Whistleblowing

The protection of whistleblowers is based on Directive (EU) 2019/1937 of the European Parliament and of the Council of 23 October 2019 on the protection of persons who report breaches of Union law, which defines the areas whose breaches can be reported in a protected regime.

Following the Company's Compliance Manual and the applicable legislation on the protection of whistleblowers, the company has internal processes and procedures for the protection of whistleblowers, established by the internal Guideline on the Protection of Whistleblowers.

In line with the established Compliance system, the company enables the confidential receipt of reports of suspected illegal actions (whistleblowing). The company guarantees the protection of whistleblowers. The application of procedures and principles stipulated in the Guideline in practice will be regularly inspected by the Company, evaluated, and enforced whereas all members of the Company bodies will set an example to their co-workers.

GDPR (General Data Protection Regulation)

The company has established the rules governing the processing of personal data as part of its business activities and handles personal data in accordance with the general binding rules such as Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (hereinafter referred to as the "Regulation"), and repealing Directive 95/46 EC ("GDPR"), Act No. 110/2019 Coll., On Personal Data Processing, as amended.

An audit and independent verification of the current setting and functioning of processes and security measures in the Company with the requirements of GDPR were performed in the Company. The audit confirmed that, since 25 May 2018, the Company has had generally recognized standards of technical and organizational security and other measures necessary to comply with relevant regulations and standards regulating the processing of personal data in accordance with the GDPR.

The company also requires its employees to follow these rules in their day-to-day work activities.

HUMAN RESOURCES

Employee policy

The company's employee policy provides and extends a stable foundation for highly qualified personnel, their professional growth and very good pay and social conditions, which are competitive on the labour market. It plays a role in the creation of professional employee attitudes towards customers, work activities, work discipline, morale, productivity, quality, and occupational safety.

I&C Energo a.s. has strong design, technical, implementation and maintenance capabilities across the whole range of activities, in particular in MV and LV wiring, I&C, low voltage distribution systems and building technology. The company has an established project department for the field of mechanical activities.

This portfolio of own resources makes it possible to handle the preparation, management, implementation and commissioning of projects, including large ones, in particular the construction and refurbishment of power generating units from the point of view of final I&C and electrical supplier, including guaranteeing their follow-up operation and maintenance.

The fulfilment of demanding requirements during outages and investment projects points to the abilities of our maintenance workers to use their knowledge, systematically acquired over the long term, and their willingness to learn how to work on new equipment very quickly. The servicing of equipment requires high-quality organizational arrangements, an active and operational approach, and knowledge that often goes beyond ordinary expertise for the maintenance of equipment or cooperation between multiple professions or specialists. The ambition of Maintenance is to carry out the scope of work with the highest level of effectivity whilst upholding safety and the quality of the work.

Our large team of highly qualified employees consists of designers and technicians with many years of experience in the nuclear industry, who carry out refurbishment projects not only in Czech nuclear power plants, but in many other countries worldwide (e.g. Slovakia, China, Sweden, Finland, Spain, etc.).

Today, with many years of experience in both conventional and nuclear power, the company employs many workers with highly specialized knowledge of the equipment of a reactor's safety and limitation systems, information and control systems for nuclear and conventional technologies, as well as in the area of reactor measurements and neutron flux measurements, radiation monitoring, emissions measurement, special measurements, turbine control systems, substation management and many other specialized fields.

Based on this knowledge, the company develops and uses many proprietary products and specialized SW e.g. for cable management, power equipment optimization and other advanced tools for the design, development, management and administration of processes.



HUMAN RESOURCES

Work on these and future projects poses major challenges for the company's employees and puts great demands on the employees' lifelong learning in technical fields as well as in design management and language skills. In these projects, teams and individuals are provided with opportunities to creatively search for new solutions and procedures, with room to use the acquired knowledge in combination with the exploitation of the latest technologies.

Structure of Education

University	23%
Secondary	53%
Secondary vocational	24%

Professional Categories

Technical	60 %
Blue collar	27 %
Ancillary	9 %
Executive	4 %

I&C Energo a.s. clearly recognizes that human capital is one of the most important factors that influences the success of the entire company. Therefore, we strive to provide our employees with extra care, which corresponds to the current requirements for a safe working environment and trends in employee welfare. Labour relations and social policy are given significant attention, which is reinforced by our cooperation with the trade unions. The care for our employees is reflected in the definition of a comprehensive system of benefits, the optimization of which is part of our personnel policy.

Great emphasis is placed on staff training and development. In our company this is a well-controlled process comprising effective, targeted and planned development of human potential. It is based on a comprehensive and unified work methodology with appropriate tools and procedures, with space for further activities and creativity. The employee plays a key role in the entire process – acquiring and using new knowledge is an obligation for each of them. Each employee of the company shares its corporate values and, as part of the fulfilment of their obligations, reflects these values in the respective form in specific work activities and the outcomes of their work.



SIGNIFICANT EVENTS IN THE HISTORY OF THE COMPANY

1993

- Establishment of I & C Energo s.r.o. with its seat in Třebíč – owners: ČEZ, a. s. (34%), Westinghouse Electric (33%), CME Třebíč (33%).

1998

- Establishment of Central Bohemia Division, Capital Projects Division and Temelín Nuclear Power Plant Division.

1999

- Share capital increased to CZK 45 million;
- Ownership change: ČEZ, a. s. (100%);
- QMS certified for compliance with ISO 9001.

2004

- I & C Energo becomes a part of CEZ Group;
- Share capital increased to CZK 150 million;
- Company changes its legal form from limited-liability company (s.r.o.) to joint-stock company (a.s.).

2005

- Westinghouse and Energoatom carry out a customer audit of the Quality Management System.

2006

- ISO 14001 certification obtained for the EMS.

2008

- Organizational unit opened in Bratislava, Slovak Republic;
- Ownership change: as of July 2008, the new 100% owner of I & C Energo is the Hungarian based MOL Plc.;
- Roll-out of new company logo.

2009

- Company successfully passes OHSAS 18001 certification audit.



SIGNIFICANT EVENTS IN THE HISTORY OF THE COMPANY

2011

- Memorandum of Understanding signed with Westinghouse Electric Company declaring their readiness to cooperate on the tender for the construction of Units 3 and 4 at the Temelín Nuclear Power Plant;
- Consolidated turnover broke through the EUR 100 million barrier thereby making the company one of the largest in Europe.

2012

- Revenues from external customers other than from the ČEZ Group hit an historical high;
- Accomplishment of the highest volume of contracts in the newly developed area of building technology.

2013

- Establishment of a joint venture (as of 1st March 2013) between I & C Energo a.s. and VF, a.s. in the area of Radiation Monitoring Systems;
- Participation in negotiations in Saudi Arabia in conjunction with Westinghouse.

2014

- Change of business name and logo – new name: OT Energy Services a.s.

2015

- Sale of a 51% share in the subsidiary AFRAS Energo s.r.o.;
- AEO certification obtained – authorized economic operator.

2016

- A permanent office in Finland established;
- The owner of OT Energy Services changed. PI 1 a.s. is its new 100% owner;
- With legal effect from 1 August 2016, the name was changed to I&C Energo a.s. The change is associated with a new visual presentation and the use of a new corporate logo.

2018

- I&C Energo a.s. is a member of the Třebíč Region Energy Association, association of municipalities and legal entities interested in maintaining the energy of the region.



SIGNIFICANT EVENTS IN THE HISTORY OF THE COMPANY

2019

- Signing a memorandum of understanding and cooperation in the nuclear field with the China Nuclear Power Engineering Company (CNPEC).

2020

- Visit of representatives of KHNP (the Korean Hydro & Nuclear Power) and discussion about the possibilities of cooperation and potential areas of integration of I&C Energo a.s. into the KHNP supply model for the construction of a new nuclear unit in the Czech Republic;
- Signing of a memorandum with Korea Hydro & Nuclear Power (KHNP) to establish partnerships in the areas of research and development and operation and maintenance of power plants.

2021

- I&C Energo a.s. became a member of CZECH POWER INDUSTRY ALLIANCE z.s.;
- sale of the 100% stake in ENPRO Energo s.r.o. to ED Holding a.s.;
- I&C Energo became the main partner and participant in the Nuclear Encounter 2021 international conference;
- signing a Memorandum of Understanding with KEPCO E&C;
- signing of a memorandum of cooperation for Unit 5 of Dukovany NPP between EDF and I&C Energo a.s.;
- I&C Energo established its subsidiary in Hungary in December 2021.

2022

- Signing of a memorandum of cooperation with Westinghouse Electric Company;
- I&C Energo was the main partner and participant in the Nuclear Encounter 2022 international conference;
- I&C Energo a.s. representatives have unveiled scaled-down replica of the Moai statue in the park of the Temelín Information Centre;
- I&C Energo has been a certified supplier for the Pakš Nuclear Power Plant in Hungary since September 2022;
- Participation in the International Technical Fair in Plovdiv;
- Signing of Memorandum of Understanding with the Korean company KEPCO Plant Service & Engineering.

2023

- Participation in the Supplier Day 2023 symposium and signing of a Memorandum of Cooperation with the American company Bechtel Power Corporation.



CURRENTLY IMPLEMENTED CONTRACTS

Dukovany NPP and Temelín NPP – Maintenance of the Logical Unit “I&C”

I&C Energo a.s. and ČEZ, a.s. concluded a long-term contract for work on Logical Unit I&C at the Dukovany and Temelín nuclear power plants. The contract is valid until 2028. The core focus is the preparation, monitoring and implementation of repairs of I&C equipment, including the provision of technical support to customers. Maintenance activities also include the provision of the required materials and spare parts within the framework of the comprehensive safety, integrity and reliability of the serviced equipment. The main part of the planned preventive maintenance of I&C equipment are type overhauls associated with refuelling and related planning, preparation, inspection and testing activities of the I&C equipment. Random maintenance is also important in combination with rapid and effective interventions, including working on stand-by for selected equipment such as Safety Systems, Control Systems, Measuring Circuits and Automatic Controls. The specified selected systems also include services for technology information systems, operational diagnostics and selected measurements of chemical processes.

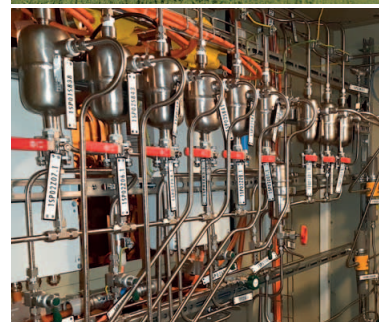
Monitoring and evaluation of defects are also an integral part of maintenance, along with the preparation of technical queries for the manufacturer (supplier) of the equipment. I&C maintenance organization also includes on-the-job training, instruction, development of knowledge, skills and improvements in the qualifications of our employees, resulting in safe, professional and effective work, including improvements in the flexibility of our staff in the maintenance of the large portfolio of I&C equipment.

Dukovany NPP and Temelín NPP – Maintenance of the Logical Unit “ELECTRICAL”

I&C Energo a.s. is the long-term supplier of maintenance services for the logical unit “ELECTRICAL”, which represents the equipment of power plant on-site consumption (working, reserve and emergency power supply), including power output. It contains voltage levels VHV (400 and 110kV), HV (24 and 6kV) and LV. The equipment consists of transformers, encapsulated conductors, generator switches, cabling, 6kV and 0.4kV electrical switchboards, electrical protection and automatic circuits, AKU batteries, inverters and rectifiers, measuring and monitoring systems and, last but not least, rotating machines.

The content of maintenance includes not only the implementation of maintenance, tests and repairs by qualified workers, but also the preparation of work, including definition of work procedures, obtaining the necessary permits and procurement of spare parts.

The important areas are the activities of electrical specialists (for example, on electrical protection of switchboards and power output, automatic voltage regulation systems, excitation systems of TG/turbine generator and DGS/diesel generator), which are essential from the perspective of reliable and safe operation of all technological equipment. Therefore, on-the-job training, instruction, development of knowledge, skills and improvements in the qualifications of employees are also part of ensuring high quality of maintenance.



Illustrative photo

CURRENTLY IMPLEMENTED CONTRACTS

Illustrative photo



Contracts for Ukrainian Nuclear Power Plants

From 2015 until 2023, I&C Energo a.s. participates in the program “Modernization and Safety Improvement of Ukrainian Nuclear Power Plants”. As part of this program, which is fully financed by the European Bank for Reconstruction and Development (EBRD), I&C Energo a.s. implemented the following projects:

- Supply of low-voltage DC switchboards for emergency power supply to all four Ukrainian nuclear power plants, i.e. to the Zaporizhzhia NPP, the South Ukraine NPP, the Khmelnytskyi NPP and the Rivne NPP;
- Supply of low-voltage switchboards for substations of internal loads, protective relays and microprocessor-based generator-transformer block automation, and blocks of switchboard power cabinets for emergency power supply to Units 3, 4, 5, and 6 of the Zaporizhzhia Nuclear Power Plant;
- Supply of low-voltage AC switchboards for complete transformer substations of internal loads for Unit 4 of the Roven Nuclear Power Plant.

The complete delivery of low-voltage switchboards amounted to 226 pcs (1,981 cabinets); the delivery further included 156 protection enclosures and 156 blocks of switchboard power cabinets. All supplied switchboards, protection enclosures and blocks of power supply boxes were manufactured by I&C Energo. The scope of supply was completed by 146 dry-type distribution transformers 400/1000 kVA.

Temelín NPP – Replacement of ESW Piping for Cooling of AC Units and Other Loads

The purpose of the project, implemented for ČEZ, a.s., is to properly ensure the supply of essential service water (ESW) to the air conditioning (AC) units and other loads on HVB1 and HVB2 of the Temelín NPP and guarantee the removal of heat from selected loads, prevention of degradation of the used material and corrosion contamination.

The goal is to increase the technical life and passage of pipeline routes of the VF system, to reduce the risk of corrosion, the deposition of corrosion products and the occurrence of leaks on the routes and components of the VF system. The project will be implemented in 10 stages between 2021 and 2027.

I&C Energo a.s. will prepare the documentation part in the scope of the replacement of routes, including preparation of Supporting Documentation of strength, life durability and seismic resistance according to the methodology ÚAM 5447/14 and according to NTD A.S.I. Section III

I&C Energo a.s. will carry out pre-assembly work on part of the pipeline routes to such an extent to allow their transport to the main production unit and assembly on site into a complete piping unit and then implementation of all dismantling and assembly work consisting in the replacement of selected pipeline routes and their components made of stainless steel (valves, pressure hoses, measuring diaphragms, throttling diaphragms)

This involves the replacement of 4,600 m of pipes with a nominal diameter of DN 25 to DN 200 and 1,900 piping parts/fittings (T-pieces, elbows, reducers, flanges, etc.). The estimated total number of welds is 5900.

CURRENTLY IMPLEMENTED CONTRACTS

Dukovany NPP – Pressure Reduction in Gas Storage Tanks

The purpose of the project implemented for ČEZ, a.s. is the installation of a return pipeline with electrical valves controlled from MCR (main control room) and ECR (emergency control room) from each gas storage tank to enable the return of the content of these gas storage tanks to the air-tight zone. The goal is to enable the use of the content of gas storage tanks in dealing with design extension accidents. As part of the work, a new pipeline will be installed, including shut-off valves and non-return valves, control of valves from MCR and ECR, indication of valve statuses, indication of vacuum in the hermetic box obtained from the measurement of the PAMS system will be put into operation. For the electrical part, the power supply, control and indication of the position of the new shut-off valves will be implemented.

The scope of supply includes the preparation of all design documentation and the project implementation.

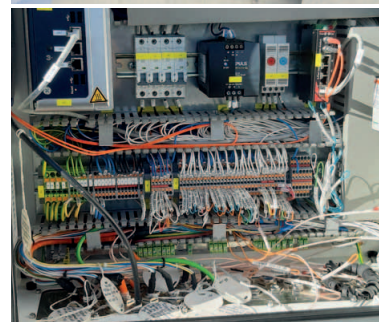
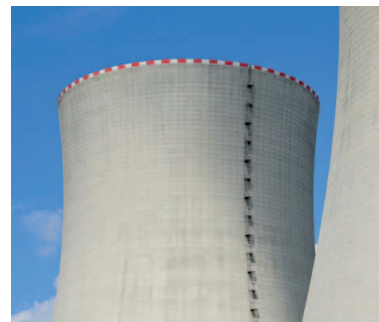
The project is implemented in five sub-units. It started in 2021 and is scheduled to be completed in 2024.

Temelín NPP – Modernization of Hydraulic Regulation of TG and PSK to HP Hydraulic System

In 2014 and 2015, two implementation stages of the modernization of the hydraulic regulation of the turbine generator (TG) and the bypass steam dump to condenser (PSK) took place on Temelín NPP Units 1 and 2. The modernization concerned increasing the reliability of the high-pressure hydraulic regulation system and, quite recently, the mutual separation of the regulation oil systems for TG and PSK. The project included the modernization of the flow parts of the low-pressure parts of the turbine, which involved the complete replacement of all three low-pressure parts of the rotor. After the overall modernization, the nominal power output of the production unit was increased to 1,080.25 MWe with a heat input to the secondary circuit of 3,132 MWt.

On Unit 2, the project designated B730 took place in the schedule shortened by seven days, which involved starting up the turning gear of the modernized turbine generator including completely new high-pressure oil regulation within 48 days of the desynchronization of the unit. In this short period of time, great emphasis was placed on capacity planning as well as the interaction of all suppliers.

The preparation of the capital investment project B730 began as early as 2010, which mainly included links between the new high-pressure hydraulic sets and servo drives to the existing WESTINGHOUSE control system, including HW modifications in this control system, newly installed power and communication cabling, modifications to the switchboards and completely new I&C cabinets, as well as proposals for control algorithms and proposals for new displays. The capital investment project, which was one of the most closely monitored modernizations at the Temelín NPP, ended with the successful implementation on Unit 2. Our company participated in the capital investment project B730 for Doosan Škoda Power s.r.o., from design preparation to implementation for a period of seven years.



Illustrative photo

CURRENTLY IMPLEMENTED CONTRACTS

Illustrative photo



Dukovany NPP – Replacement of Rectifiers and Inverters

The contract for ŠKODA PRAHA a.s. is being implemented from 2021 to 2027. The scope of supply is the preparation of the documentation part, the delivery of rectifiers and inverters, the subsequent implementation at the Dukovany NPP, and the implementation of all necessary adjustments and other required modifications to the affected components, structures and systems.

The entire project will ensure the replacement of rectifiers and inverters of emergency power supply of the unit first category of Dukovany NPP system 1, 2 and 3 and the rectifiers of the 5th system with new types that will enable safe and reliable power supply of all safety systems of the emergency power supply of category I.

Mochovce NPP – Replacement of H_3BO_3 Concentration Analyzers

In 2015, a contract for the replacement of boric acid (H_3BO_3) analyzers on Mochovce NPP Units 1 and 2 was concluded with Slovenské elektrárny, a.s. The existing analyzers – boron meters – were obsolete, with no possibility of getting spare parts. New solution was based on the delivery and installation of I&C Energo a.s.' own boron meters, type BorAn PN160. Production took place until July 2016. Installation took place during individual outages in the course of 2017.

Boron meters continuously measure the concentration of the isotope of boron ^{10}B in reactor coolant of the nuclear power plant. Based on the known composition of boric acid, the measured value can also be presented as the concentration of boric acid.

The implementation of the work on one unit consisted in the replacement of two single-channel and two two-channel suspension boron meters on the existing technological pipeline with a diameter of 108 mm. Two-channel boron meters are installed in the air-tight zone.

To monitor the concentration of boric acid in the reactor, a single-channel flow boron meter was installed on each unit. In order to avoid potential rupture of the water column, which occurred with the original solution and due to which the operator did not have information about the concentration in the reactor, an industrial peristaltic pump was installed upstream of the flow boron meter, which ensures a continuous flow of 75 l/h at a low (approximately 10.5 m) and a high (approximately 21 m) level in the reactor.

Boron meters are installed in the technology, including sensors of basic quantities – detection of the pulses of slow neutrons, corresponding to the concentration of boric acid; temperature of the coolant at the point of measurement of pulses and measurement of flow using a flow boron meter. All signals are carried to the evaluation unit of the appropriate channel of the boron meter.

Boron meters are connected to each other via RS485 data communication to the Boron Meter Control and Diagnostics System, which ensures the servicing, archiving and calibration functions of the boron meters. The Boron Meter Control and Diagnostics System is implemented by a Simatic system.

CURRENTLY IMPLEMENTED CONTRACTS

Temelín NPP – Gradual replacement of pipes for essential service water in the primary circuit

The project was divided into seven sub-units, including pre-assembly work, and was implemented between 2015 and 2018. This involves the replacement of supply, discharge, drainage and venting pipes, including piping components – fixtures on the essential service water (TVD) system from carbon design to stainless steel design, type 17 348.

This investment event was implemented as part of shutdowns at the Temelín NPP. The investment was fully in line with the implementation design. Our company provided ČEZ, a.s. with design and implementation impacts for machine parts. Design preparations commenced at the beginning of 2015. This included creating a new layout so that difficult to reach places became more accessible therefore making it possible to replace the original metal pipes with new stainless steel pipes.

The implementation of DČ2 was divided into two separate stages. The first preparatory stage took place in 2015, prior to the outage. This included all the necessary pre-assembly activities. These activities accounted for 80% of the overall scope of the work for the given system. The second stage involved the dismantling of the original equipment and the installation of new pipe components during the planned outage of the TVD system during GO1 in 2015. Implementation of DČ2 in HVB1 was successfully completed within the specified term. This was in part due to the top-quality pre-assembly, but mainly due to the commitment and quality of all our staff who participated in its implementation.

Dukovany NPP – Construction of Administrative Building 3 – Electrical Part

I&C Energo a.s. is the supplier of the complete electrical part in the construction of a new administrative building at the Dukovany Nuclear Power Plant, which is being implemented for ČEZ, a.s. by Metrostav a.s. The deliveries ensured by our company include the preparation of design documentation, including designing in the BIM (Building Information Modelling/ Management) model, the complete delivery of the electrical part and the preparation of documents for DoSP (as-built documentation).

The electrical part includes heavy-current and weak-current distribution systems, equipment for cable channels, electrical part, outdoor lighting in the area of the power plant, the LAN technological data network, weak-current cable lines (external), equipment for stations with a uniform attendance system and improvement of the existing EPS. The implementation – by the end of 2023.



Illustrative photo

CURRENTLY IMPLEMENTED CONTRACTS

Illustrative photo



Mondi Štětí – Reconstruction of the high-voltage substation 6kV E105

I&C Energo a.s. realized a contract entitled “Reconstruction of the high-voltage substation 6kV E105” on the premises of Mondi Štětí, Energy Division. This substation powers the technology of the K10 boiler. This contract involved dismantling the existing VH151 switchboard, with twenty-three arrays, and replacing it with a new UNIGEAR ZS1 switchboard produced by ABB, with eighteen arrays, including the preparation of design documentation.

This work also included the disconnection of existing control and power cables and modifications to and the addition of cables in the cable space below the substation. Structural adjustments to the floor were necessary for the installation of the new switchboard. In practice, this meant that it was necessary to make holes in the floor for power and control cables and to fix the steel frame for installing the new switchboard. This new switchboard was assembled in two steps, whereby nine chambers were set opposite each other. The customer required the existing cables, mostly power cables, to be preserved and some additional 6 kV cables to be coupled. 6 kV RAYCHEM terminals had to be fitted to all coupled chambers with power cables. The first half of the switchboard was mounted in the presence of ABB’s supervisor, while the other half was performed solely by our employees. All calculations and protection settings were performed by ABB.

GRANITOL Moravský Beroun – Production of a regenerative unit for the incinerator of waste vapours of volatile organic compounds

In 2021, I&C Energo successfully completed a major engineering contract in the field of air protection for HK ENGINEERING s.r.o. Specifically, this was the production of a regenerative unit for a VOC waste vapour incinerator.

This was a three-chamber unit with a maximum flow rate of 23 000 Nm³/h and a total weight of more than 18 tonnes. The dimensions of the unit: 8m wide × 3m deep × 8.5m high. The unit was completely sandblasted, coated with a special two-component coating and fitted with a 300 mm thick Sibral thermal liner.

The produced unit was successfully installed in the VOC waste vapour incinerator at GRANITOL in Moravské Beroun and operates in unattended mode in accordance with the requirements of stem production, guaranteeing the removal of pollutants within the limits required by the relevant legislation.

This was a pilot project and the experience gained will be used in other similar implementations of industrial air cleaning and organic solvent recovery units. The entire production was carried out in I&C Energo’s workshops on the premises of the Mělník Power Plant.

CURRENTLY IMPLEMENTED CONTRACTS

Use of SSK in I&C Energo projects

The Cabling Management System (Systém správy kabeláže – SSK) is a specialized software tool to support the design, implementation and operation of cabling systems for large technological systems, developed and used by our Company for over 10 years.

Since 2007 the SSK system has been deployed in the Dukovany Nuclear Power Plant to provide complex management of its cabling system, including operations from the design of modifications and upgrades to change management, controlled documentation management and to the performance of various analyses and evaluations. Deployment in the Dukovany Nuclear Power Plant is currently the greatest application of SSK. The system presently manages over 250,000 cables with a total length of over 17,000 km, or 16,000 cable routes with a length exceeding 180 km.

Based on its successful deployment in the Dukovany Nuclear Power Plant, the SSK system has been also used for the complex management of the cabling system in the Temelín Nuclear Power Plant since 2012, with a similar scope of operations and services provided.

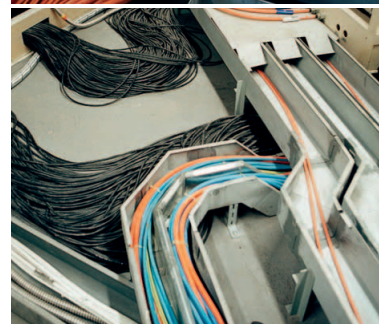
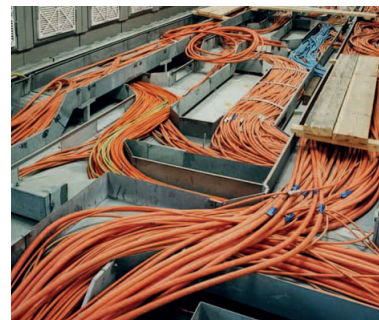
Aside from applications in nuclear power plants, the SSK system was also used in the past to support the design and implementation of cabling systems in conventional energy sources, specifically in complex renewal projects in the Tušimice II Power Plant (2008–2013) and Pruněřov II Power Plant (2013–2017) or for the construction of new units of the Ledvice Power Plant (2009–2016) and the Počerady Power Plant (2011–2014).

Dukovany Nuclear Power Plant – Renewal of I&C for non-unit equipment

The subject of the work was to ensure the long-term operability of the SKŘ equipment of selected non-block objects of NPP Dukovany, the creation of an industrial communication network that will connect individual operating files and the creation of a central control room for non-block objects. The SKŘ equipment of non-block objects has been replaced with technology that will ensure a sufficient service life and supply of spare parts so that the equipment can be operated for at least fifteen years.

The entire work consists of 31 separate sub-units. The most important sub-units are the creation of a new central control room for non-unit facilities (CVNZ), including a technology network for non-unit facilities, modifications to shared control room SDB1,2, surveillance of nuclear auxiliaries buildings DBAPP1,2, a control system for HVAC equipment ŘSVTZ1,2,3,4, a control system for high-pressure and low-pressure compressor stations ŘSVTKS1,2 ŘSNTKS, a control system for nitrogen unit ŘSN2, a control system for central pumping stations ŘSCČS1,2, a control system for chemical water treatment plant ŘSCHÚV and a control system for unit condensate treatment plant ŘSBÚK1,2,3,4.

Approximately 300 I&C cabinets and about 2,000 measuring circuits will be replaced during the work. An internal testing site will be set up to ensure tests of the control systems. Employees with long-term experience of contracts for I&C Renewal in EDU are an invaluable asset for this contract.



Illustrative photo

CURRENTLY IMPLEMENTED CONTRACTS

Illustrative photo



Tušimice Power Plant – Delivery of Supervision, Diagnostics and Optimization System of Individual Units

The implementation consisted in the delivery of the PowerOPTI optimization and monitoring system from I&C Energo a.s. and its configuration for the Tušimice power plant, in order to monitor and control the efficiency of the power plant in near real time.

On the basis of the detailed analysis of the modelled technology, thermodynamic models were designed and debugged for the detection, identification and elimination of gross measurement errors and the accurate recalculation of not measured quantities using the Data Reconciliation method.

A key system component is the on-line diagnostics on asset health and optimization of the thermal cycle using highly accurate empirical models (digital twins). The goal is the early detection and notification of device failures, or device operation in non-standard mode by comparing the current state with the predicted state determined by the model.

The implementation of the PowerOPTI system includes the configuration of operational and diagnostic screens, contextual graphs and KPI configuration, including sending of notifications to responsible users.

The PowerOPTI system at the Tušimice power plant has been in standard operation since 2018 and service support is provided by I&C Energo a.s.

Sokolovská uhelná, legal successor of a.s. – Feasibility Study of the Involvement of Energy Hub

In connection with the fulfilment of the obligations undertaken by the Czech Republic in 2015, the transformation process of Czech power engineering is taking place, the main goal of which is to eliminate CO₂ emissions, which occur during burning of coal in coal-fired power plants. The experts are talking about so-called “decarbonization” of Czech power engineering, which in principle means the gradual shutdown of coal-fired power plants and their replacement by renewable resources, or their transformation into natural gas or biogas.

On the basis of these facts, I&C Energo a.s. conducted an impact study for our customer to assess the impacts during the transformation of power engineering of Sokolovská uhelná, legal successor of a.s., when the existing coal units will be completely shut down, partially replaced by renewable sources in the form of photovoltaic and wind sources, and battery storage will be used to stabilize production. At the same time, however, grid stability will be ensured, not only within the Karlovy Vary Region, because all sources, both existing steam-gas units and new renewable sources in combination with battery storage, will be connected to one node.

The entire Energy Hub system, including the design of efficient management, is set to withstand potential blackouts. The draft study also reflects potential changes in the distribution grid, by gradually removing the 220kV voltage level. In the case of project implementation according to the study prepared by us, the possibility of controllable abandonment of coal for energy use will be created without the risks associated with the lack of planning of production of renewable energy.

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Brno

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JE Dukovany NPP

Dukovany, 675 50 Dukovany

Temelín NPP

JE Temelín, 373 05 Temelín 2

Kláštorec nad Ohří

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Plzeň

Klatovská třída 1461/85, 301 00 Plzeň

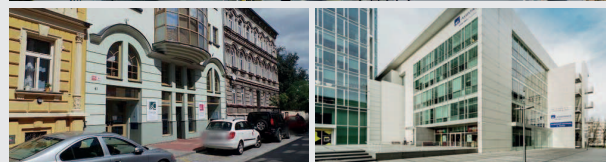
Karlovy Vary

Jateční 1330/17, 360 01 Karlovy Vary

Elektrárna Mělník

277 03 Horní Počaply

Týn nad Vltavou – Production and storage hall



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