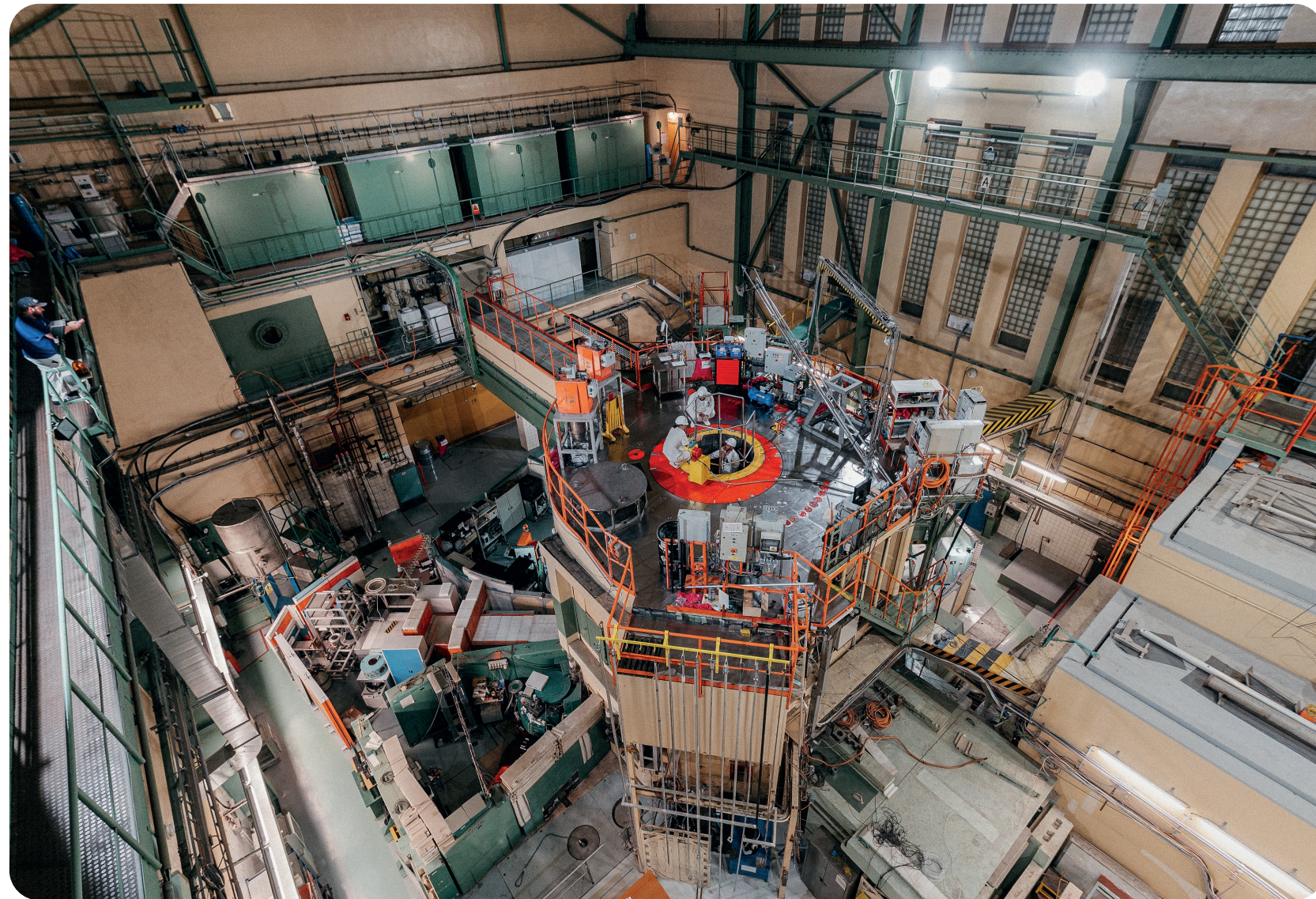


**MORE THAN 20 YEARS OF NUCLEAR
RESEARCH AND DEVELOPMENT**





INTRODUCTORY WORD



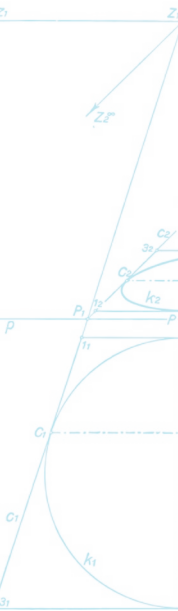
Dear friends, a significant milestone in the history of nuclear research in the Czech Republic was the year 2002, when the company Research Centre Řež (CVŘ) built on the more than 50-year tradition and rich experience of its parent company ÚJV Řež (former Nuclear Research Institute). Today, we have unique, interconnected experimental infrastructures, know-how and specialized work teams with a number of recognized experts in the field of nuclear and conventional energy. The Research Centre Řež is now a major R&D institution not only in the region but also in Europe and the OECD countries. Our company has been a sought-after partner for national and international research projects for many years. Examples of cooperation are the projects of TA CR Théta and National Centres of Competence, Security Research (MoI), OPEIC (MIT), etc. At the international level, these are mainly research activities within the European projects Hori-

zon 2020 and Horizon Europe, where we are currently collaborating on more than twenty projects, two of which we also coordinate. Among the company's significant international activities is its involvement in the international project of the Jules Horowitz Reactor (JHR) in France. By designing, constructing and supplying the hot cells for this European research reactor, we are one of the few companies in the world capable of supplying such demanding technologies. At the same time, in cooperation with other members of the JHR consortium, we are also involved in the preparation of experimental programmes and tools for the JHR within the Euratom and OECD/NEA projects, helping to prepare the conditions for the Czech Republic to use the capacity of this reactor in accordance with the conditions of the Czech in-kind supply. Similarly we are involved in the preparation of the European Spallation Source (ESS) in Lund, Sweden, in cooperation with the CAS. CVŘ cooperates intensively with domestic and foreign industrial partners such as ČEZ, Škoda JS, Doosan Škoda Power, General Electric, Mitsubishi, Hitachi, and others. An important element of research cooperation is the possibility of providing experimental infrastructures in the form of "open access". It is also worth mentioning the extensive cooperation with universities both in



the field of education and in R&D projects. We cooperate on research projects with, e.g. Czech Technical University in Prague, University of Chemistry and Technology Prague, University of West Bohemia, Brno University of Technology, and VSB Technical University of Ostrava. Within the framework of international projects, CVŘ develops cooperation with European and international universities, such as MIT, Georgia Institute of Technology, University of California Berkeley, Japanese universities Nagoya University, or Tokyo Institute of Technology. We believe that together with you, our partners, we will continue to maintain a high level of research activities and move the world's energy industry one generation further.

Milan Patrik
CEO



CVŘ IN TIME

1955

Institute of Nuclear Physics of the Czechoslovak Academy of Sciences founded in Řež

1957

the first Czechoslovak VVR-S reactor with an output of 2 MW_t (predecessor of today's LVR-15) was launched in Řež

1972

the Institute is divided into the Institute of Nuclear Physics and the Nuclear Research Institute

1972

TR-0 experimental reactor (predecessor of today's LR-0) put into operation

2007

joining the Jules Horowitz Reactor consortium

2002

CVŘ was established by separating it from the Nuclear Research Institute Řež, and subsequently the two research reactors were separated

1989

commissioning of the LVR-15 reactor (reconstruction of the VVR-S reactor)

1983

commissioning of the LR-0 reactor (reconstruction of the TR-0 reactor)

2012

launch of the Sustainable Energy (SUSEN) project with an investment of CZK 2.5 billion

2017

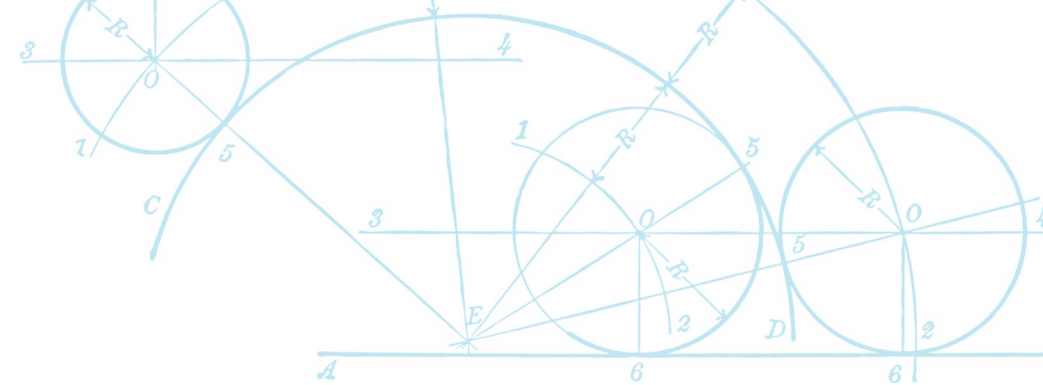
SUSEN technology commissioned

2018

Research Centre Řež initiated the establishment of the National Centre for Energy

2022

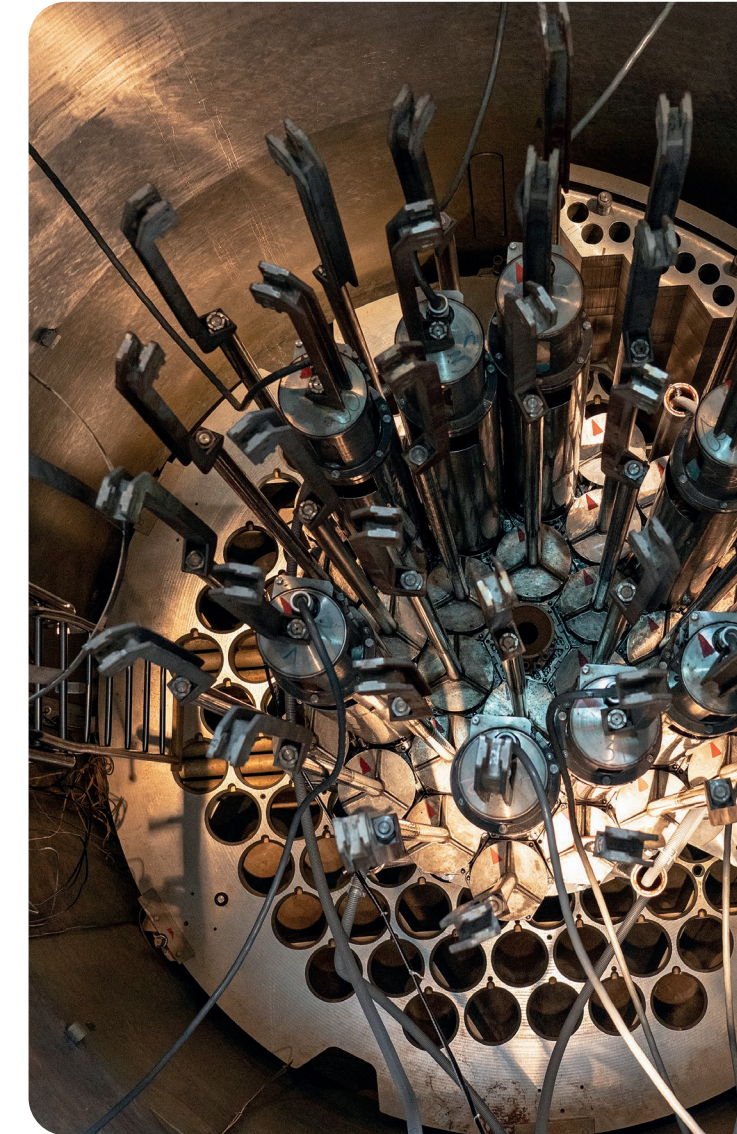
CVŘ initiated the establishment of the Centre for Advanced Nuclear Technologies (CANUT)

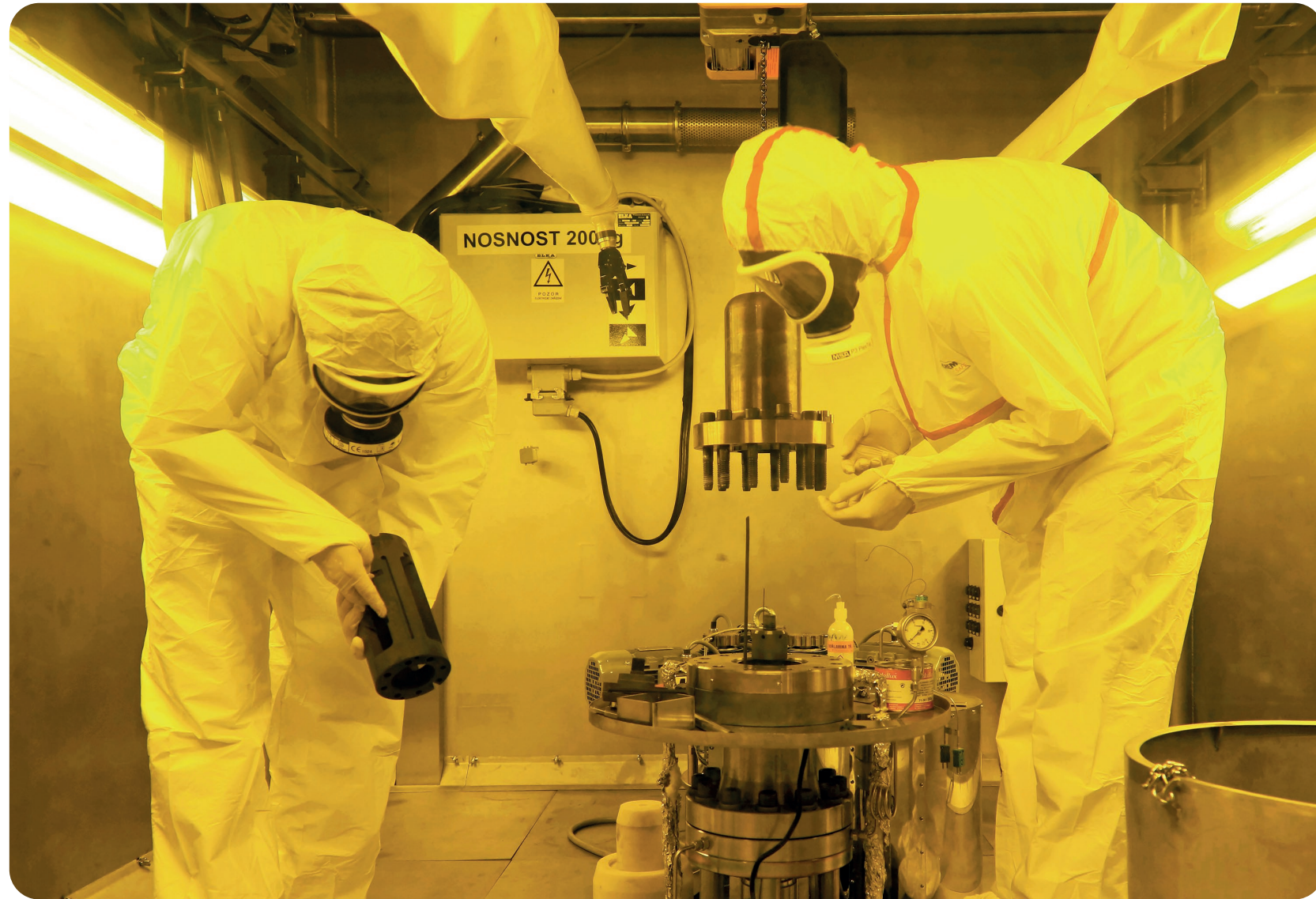


HISTORY OF THE CVŘ

The Research Centre Řež (CVŘ) continues the seventy-year tradition of nuclear research in the Řež valley. Already in 1957, the first nuclear reactor in the former Czechoslovakia was put into operation here, making us the ninth country in the world to launch a controlled fission reaction and thus ushering in an era of basic and applied research in the peaceful use of nuclear energy and ionizing radiation. In the following years, the Nuclear Research Institute developed into a leading engineering organization providing technical support not only to Czech nuclear power plants. The Research Centre Řež was established in 2002 by spinning off from the Nuclear Research Institute Řež (as a research organisation with the ambition of developing advanced nuclear technologies and

new methods for improving the safety and reliability of nuclear power plants. Subsequently, the two research reactors were also transferred to the CVŘ. A very important milestone in the history of our company was the implementation of the SUSEN (SUStainable ENergy) project, under which more than CZK 2.5 billion was invested in the construction of technologies, some of which are unique in Europe or even worldwide. Thanks to this, the Research Centre Řež has become a highly sought-after partner for research and development, and we are able to participate in major European projects and collaborate on the development of new technologies together with industrial partners not only from the Czech Republic, but also from the USA, Japan, France and many other countries.



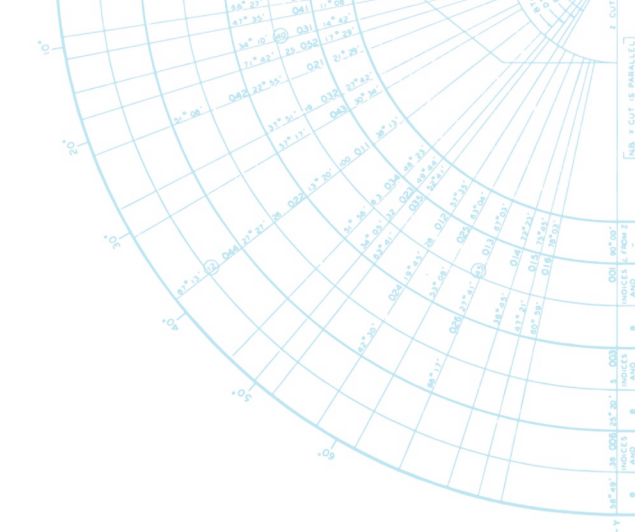


RESEARCH INFRASTRUCTURES



The backbone of the research infrastructure of the Research Centre Řež is the LVR-15 reactor, which, in conjunction with the hot cells and electron microscopy laboratories, forms a unique complex in Europe, providing opportunities for cutting-edge materials research in nuclear energy. This backbone infrastructure is complemented by experimental loops and autoclaves for exposure of mate-

rials and components in various media and under extreme conditions, chemical laboratories, facilities for mechanical testing of materials and components, enabling research and development not only for the current generation of light water nuclear reactors, but also for the development of Generation IV reactors and fusion technologies.



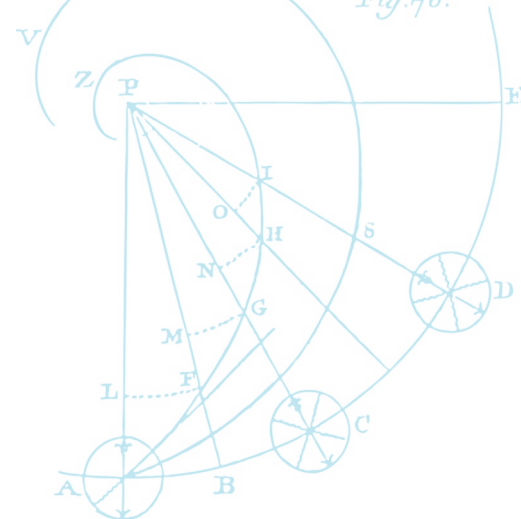
DEVELOPMENT AND SUPPLY OF ENERGY TECHNOLOGIES



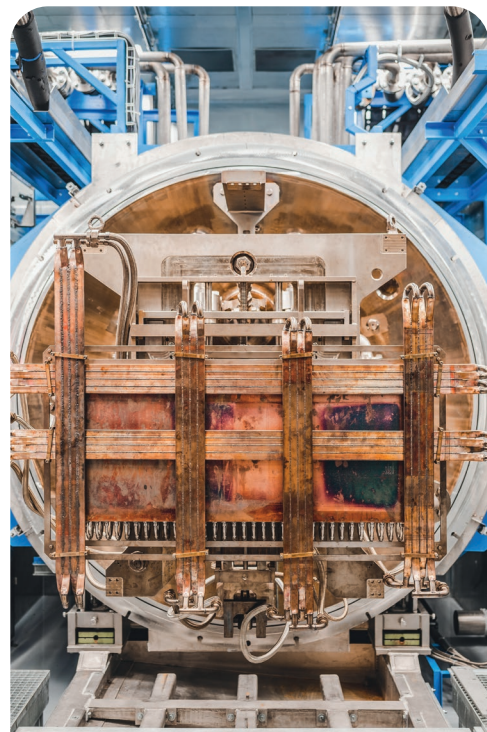
The Research Centre Řež focuses on the development of modern energy technologies in accordance with the latest world trends and on the supply of large technological units and special experimental equipment. In doing so, we make use of the experience gained in the delivery of unique infrastructures built within the SUSEN project or the delivery

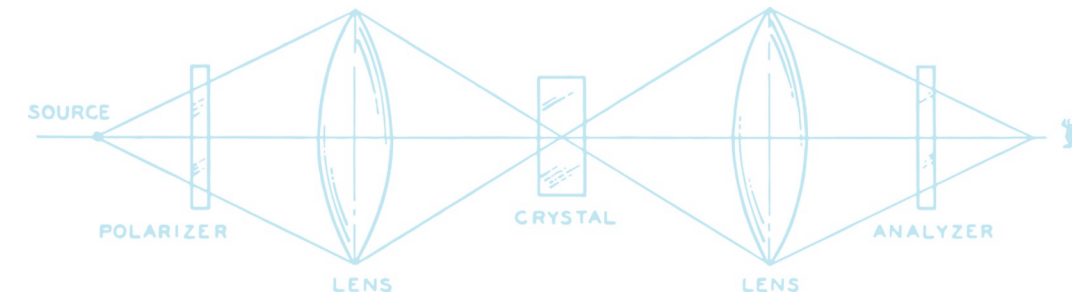


of hot cells for the Jules Horowitz Reactor in France. Among the most important facilities developed, designed and commissioned at the Research Centre Řež is the HELCZA (High Energy Load CZech Assembly) technology, which is designed for testing components with extreme heat fluxes (up to 40 MW/m^2) and is currently the only facility in the world capable of testing first wall panels and other components for the ITER fusion reactor. Our domain is large-scale energy storage technology, where we focus on developing systems capable of storing tens to hundreds of megawatts over several days (Thermal Energy Storage, TES). We are preparing the construction of a pilot storage unit at the Mělník Power Plant site. Another of the advanced energy technologies, in the development of which we are at the world's top, are thermodynamic circuits with high efficiency based on supercritical CO_2 –



here too we are preparing the construction of a pilot unit in cooperation with industrial partners. Large technological units are also supplied by Research Centre Řež to foreign partners (see a selection of references); the approach to in-house development and production of technologies strengthens our competences and puts us among the best companies in the field.





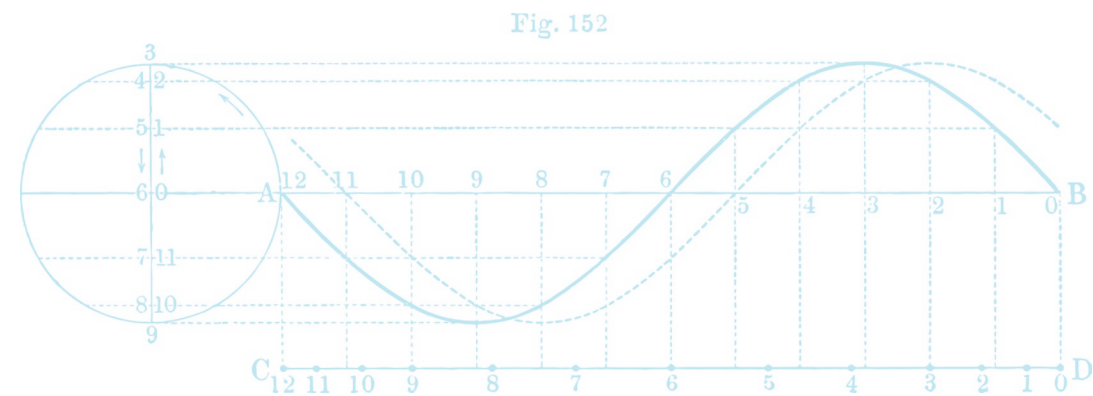
MATERIALS RESEARCH AND DIAGNOSTICS



Our traditional domain is materials research with a focus on materials exposed to extreme conditions, such as nuclear fuel cladding or structural materials for Generation IV nuclear reactors cooled by salts, supercritical water, lead or helium. We have established a successful collaboration with nuclear fuel producers, focusing on testing advanced types of coverage (Accident Tolerant Fuel, ATF), collaborating on the development and testing of advanced materials (High Entropy Alloys, HEA), surface treatments and methods of material hardening (Laser Shock Peening, LSP). In the field of operation and

maintenance support for nuclear and conventional power plants, we focus on the development of advanced non-destructive testing methods and the related development of manipulators for their application in hard-to-reach areas (high radiation). In cooperation with partners from the United States of America and Japan, the Research Centre Řež has developed unique methods for studying the radiation ageing of concrete shielding in nuclear power plants. The Research Centre Řež is thus making a significant contribution to improving the safety, reliability and lifetime extension of power plants.





NUCLEAR SAFETY AND REACTOR PHYSICS



We focus on nuclear safety, thermohydraulic and strength analyses to support operators and independent evaluation of nuclear power plant operations. With the Cold Crucible Laboratory, one of the few facilities in the world licensed to melt radioactive materials, we obtain key data on the physical properties of molten corium, which are essential for refining models for simulations of severe nuclear reactor accidents. We have a facility to qualify components that must ensure safe operation under Loss of Coolant Accident (LOCA)

conditions. In the field of reactor and neutron physics, our experts are succeeding in refining internationally used nuclear data libraries thanks to the unique capabilities offered by the LR-0 experimental reactor. Our experience and competences are also used in the framework of witness programmes for the evaluation of the condition of the reactor vessels of both Czech nuclear power plants.



A SELECTION OF REFERENCES



ČEZ

Czech Republic

development of manipulator for weld inspections of Dukovany Power Plant emergency and control cassette sleeves

Škoda JS

Czech Republic

development of shielding materials for spent fuel containers

Hitachi

Japan

development of methods for debris separation below Fukushima reactors

Fusion for Energy

EU

experimental support for the development of panels for the first wall of the thermonuclear reactor ITER

Mitsubishi Heavy Industries

Japan

measurement of physical properties of corium

CEA

France

hot cells for the Jules Horowitz Reactor

Oak Ridge National Laboratory, Mitsubishi Research Institute

USA, Japan

measurement of physical properties of corium

ESS

Sweden

helium cooling circuit of the spallation source target

ČEZ, ÚJV Řež

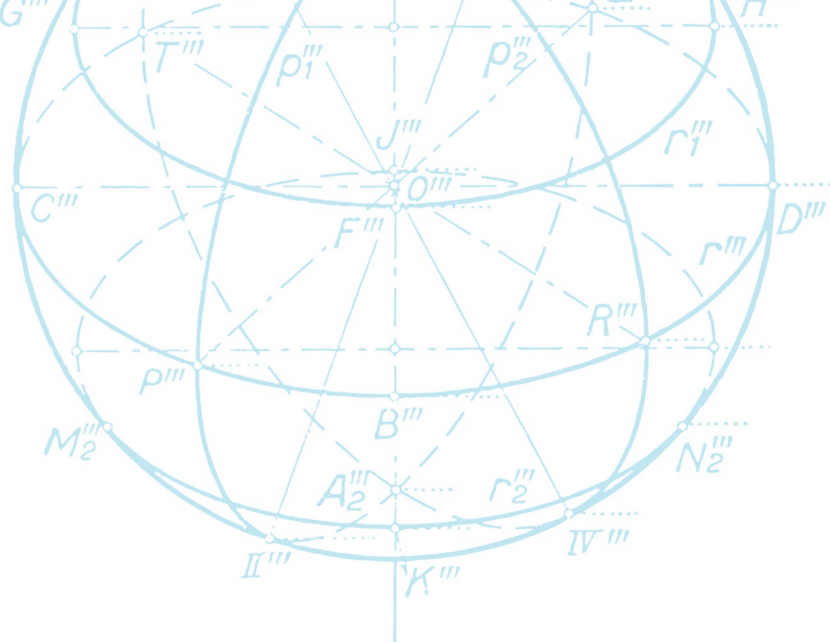
Czech Republic

fluence evaluation of pressure vessels of Dukovany Power Plant and Temelín Power Plant reactors

IRE

Belgium

Mo/Tc radionuclide generator for nuclear medicine





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