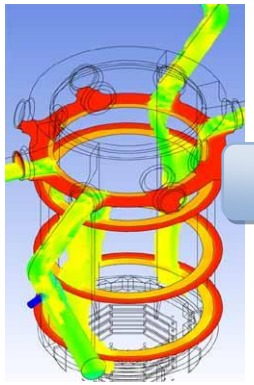
TECHNOLOGICAL PLATFORM OF NUCLEAR FISSION ENERGY



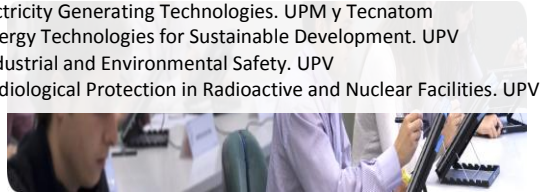
The technology platform CEIDEN is a Spanish institution established to coordinate the needs and efforts of R&D and innovation in the field of nuclear fission technology.

One of the CEIDEN programs is the CEIDEN F+ work group. The objectives of this group are to promote the coordination of Education and Training (E&T) programs at the national and support the Spanish participation in international programs and networks (EU EUROSAFE, IAEA, Foratom, Latin America, among others).
Main activities of the CIEDEN are:

- Promote the coordination of national nuclear energy E&T programs, both to discern strengths and weaknesses assessing if they meets the current and future needs and to facilitate exports abroad.
- Assist the launch of advanced R&D and Innovation projects in E&T to enhance the nuclear capabilities nationwide available in nuclear sector.
- Support and Coordinate the Spanish participation in international E&T programs (UE, EUROSAFE, Foratom, Latin America) by creating and participating in national and international networks and organizations.
- Boost the accreditation of on-the-job training.
- Update the Nuclear Masters Catalog and the Nuclear Training Capability Catalog derived from the activities of the CEIDEN F+.

MASTERS INVENTORY

- Master Course in Nuclear Engineering and Applications. UAM y CIEMAT
- European Master of Science in Nuclear Fusion and Engineering Physics. U. Gent, Carlos III, UPC y UPM
- Master's Degree in Nuclear Technology and Instrumentation. U Huelva
- Master's Degree in Sustainable Energy Engineering. UP País Vasco
- Master's Degree in Nuclear Engineering. UPC
- Master's Degree in Energy Engineering. UPC
- Master's Degree in Energy Engineering. UPM
- Master's Degree in Nuclear Science and Technology. UPM
- Master Course on Electricity Generating Technologies. UPM y Tecnatom
- Master's Degree in Energy Technologies for Sustainable Development. UPV
- Master's Degree in Industrial and Environmental Safety. UPV
- Master's Degree in Radiological Protection in Radioactive and Nuclear Facilities. UPV



TRAINING CAPABILITIES

NPP OPERATION

- Licensed Operator Training
- Non-Licensed Operator Training
- Training In Maintenance
- Engineering
- Chemistry
- Radiological Protection
- Nuclear Safety and Licensing
- Nuclear Materials

NUCLEAR FUEL CYCLE

- Mining and Extraction of Uranium Concentrates
- Management and Supply of Enriched Uranium
- Nuclear Cycle Management
- Fuel Manufacturing
- Refueling Engineering
- Fuel Engineering
- Isotopic Inventory Calculation, Neutronic, Montecarlo
- Fuel Operation Support
- Radiological Protection
- Radiochemistry
- Handling of Fresh and Spent Nuclear Fuel
- On-Site Fuel Inspection
- Onsite Fuel Repair

RADIOACTIVE WASTE MANAGEMENT

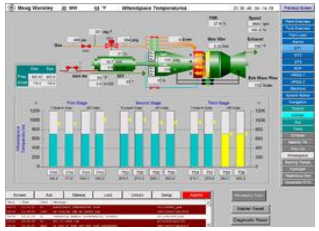
- Decommissioning
- Engineering
- Radiological Protection
- Operation and Maintenance of waste storage facilities
- Decommissioning of Uranium mines and Uranium Production facilities
- Spent Fuel Isotopic Characterization
- Radioactive Waste Management
- Radioactive Waste Characterization

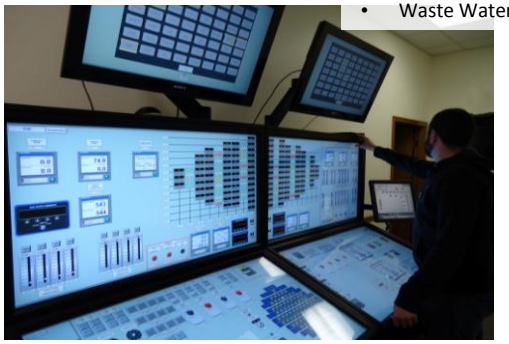
DESIGN, ENGINEERING, CONSTRUCTION, ASSEMBLING, LICENSING AND START-UP OF NUCLEAR FACILITIES

- New Reactors
- Nuclear Safety and Licensing
- Probabilistic Safety Analysis
- Engineering
- New Nuclear Power Plant Projects
- Analysis of Severe Accidents

PROMOTION OF NUCLEAR ENERGY AND SAFETY

- Dissemination of the Nuclear Energy and Technologies.
- Radiological Protection
- Nuclear safety





COMMON AREAS

NUCLEAR SAFETY MANAGEMENT

- Nuclear Safety and Licensing
- Risk Prevention
- Safety Culture
- Human Factors Engineering
- Leadership Development
- Total Quality Management
- Operating Experience Analysis Methodologies
- Failure Analysis
- Innovation strategies

RADIOLOGICAL PROTECTION AND DOSIMETRY

- Radiological Protection
- Dosimetry
- Photon and Neutron detection systems
- Hot Cells
- Radiation Shielding

FUEL

- Logistic and Transport of Nuclear Materials
- Criticality
- Neutronic
- Thermomechanics of the Fuel Assembly
- Monte Carlo Simulation Methods

TRAINING

- Knowledge Management
- Instructors Certification
- Training Methodology
- On-the-Job Training

MATERIALS & INSPECTION AND TESTING METHODS

- Inspection and Testing Methods
- Materials, Analysis, and Applications
- Corrosion
- Calibration
- Welding Process
- Inspection of Welded constructions

OTHER KNOWLEDGE AREAS

- Environmental Impact Assessment
- Waste Water Treatment
- Energy efficiency management

TOOLS AND METHODS

Simulation, facilities for specific practices and human performance simulators are key technologies in training and engineering to facilitate the essential role of developing understanding and safe operation of the plant. In conjunction with these, nuclear training uses e-learning stations and computer codes to ensure the necessary competences in the different plant positions.

Tools and methods focused on training of the Spanish nuclear industry are the following:

Full Scope Control Room Simulator

- Full scope simulators available for training purpose:
  - General Electric BWR design
  - Westinghouse PWR design
  - Siemens-KWU PWR design
- Main Control Room Simulator development or turn-key projects

Interactive Graphics Simulator (IGS)

- Training (Operation and Engineering)
- Technologies: BWR, PWR, Gen 3+

Human Factors Simulator (Field Simulator)

- Hydraulic loop and the corresponding control room with 11 training stations
- Single-pass gate to vital areas

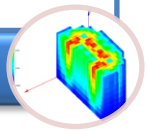
Computer-based Training (CBT) and e-learning stations

Facilities for Specific Practices

- Fuel factories
- Transportation and storage of radioactive material

Use of Computer Codes

- FRAPCOPN
- FRAPTRAN
- MELCOROASTEC
- RODOS
- MAPA
- Microshield
- MCNP
- Radiation shielding analysis
- Nuclear fuel performance and design
- Core design



For more information please visit the CEIDEN website
http://www.ceiden.com/

CEIDEN