Methods and equipments for post irradiation testing at Kiev Institute for Nuclear Research

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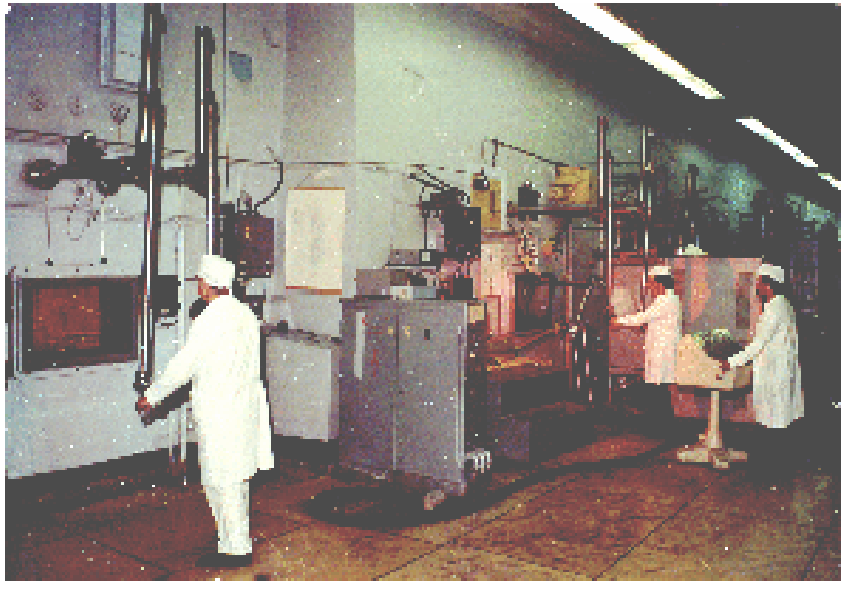
Hot cell laboratory at KINR

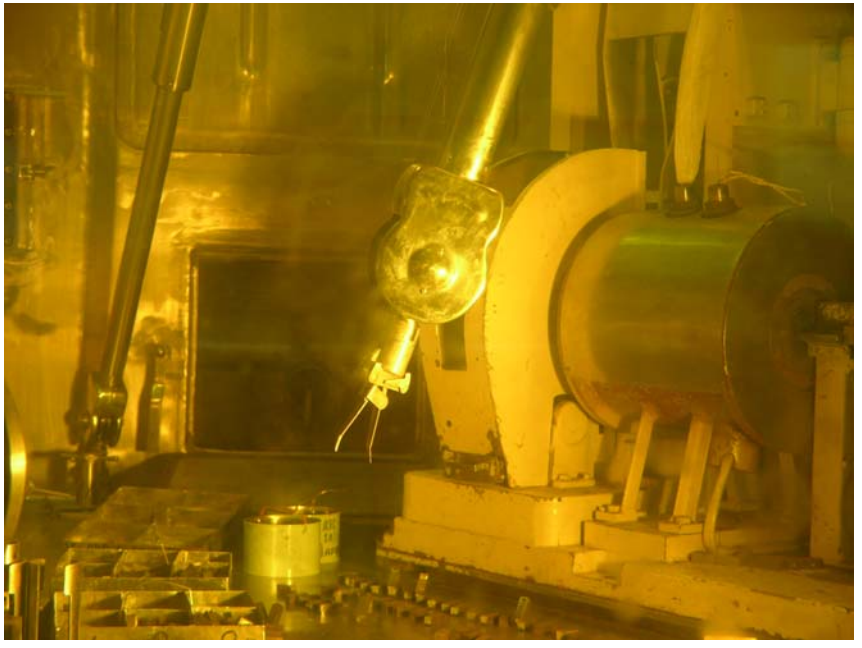


- Eight hot cells
- Radioactive waste handling
- Milling cutter machine
- Servo hydraulic testing machine
- Pendulum impact tester
- Electromechanical testing machine
- Electro erosion discharge machine
- Electron beam welding machine
- Metallographic microscope

Experience in post irradiation testing

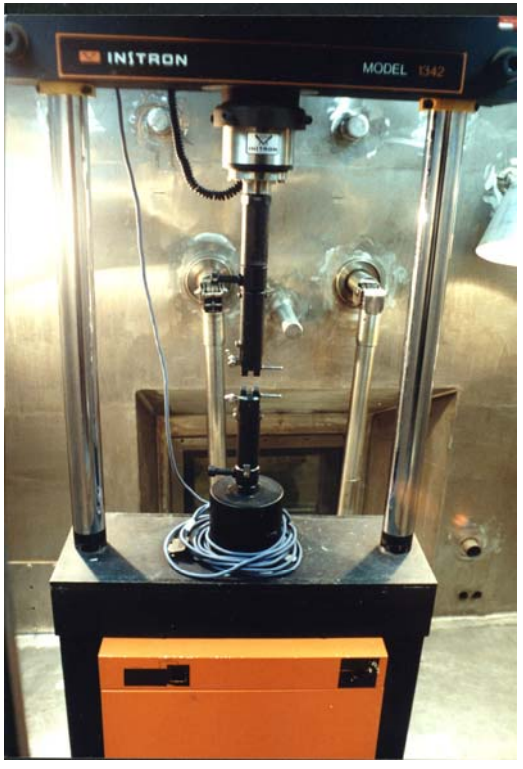
- Investigation of structural materials for nuclear reactors in the frame of research programs
  - Tension and Charpy impact tests
  - Metallographic microscopy
- Analysis of technological fuel channel damages for Chernobyl NPP
  - Tension testing
  - Metallographic microscopy analysis
- Surveillance specimen program
  - Tension and Charpy impact tests
  - Fracture mechanics testing
- Reconstitution technique is going to be used at present

Charpy impact testing



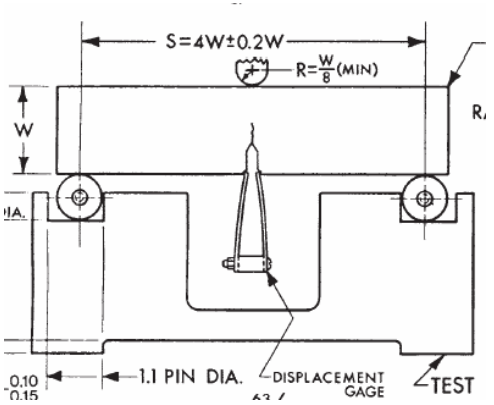
- Pendulum impact tester KMD-30D
- C-type pendulum
- Temperature chamber with specimen feed system
- According to GOST 9454
- Capacity: 300 J
- Temperature range: - 150 to 350°C
- Impact velocity: 5.5 m/s

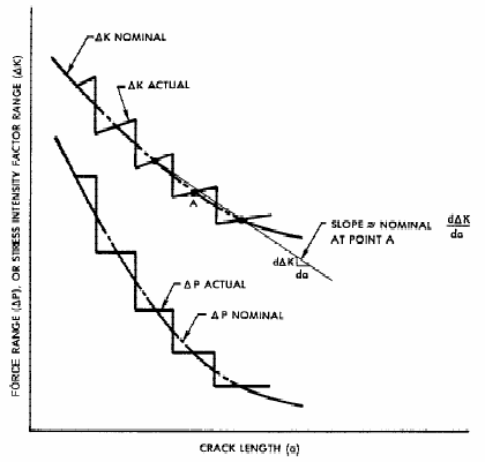
Tension and fracture mechanics testing



- Electromechanical actuator
- Static load: 100 kN
- Temperature range: - 150 to + 350°C
- Fracture toughness tests according to ASTM E1921-05
- Fracture mechanics specimens: precracked Charpy and compact 0.5T C(T)
- Surveillance tests: tension and fracture toughness specimens

Specimen pre-cracking equipment





- Servo-hydraulic testing machine
- Dynamic load: ± 50 kN
- Temperature range: - 100 to + 350°C
- Frequency: up to 20 Hz
- K_{max} decreasing method used
- Crack size estimation: compliance method
- According to ASTM E1921-05
- Specimens: Charpy size SE(B) and compact 0.5T C(T)

Reconstitution technique

- Electron beam welding machine
- Power density: 10^7 Wt/cm^2
- U_{acc} = 50 kV
- I_{beam} = 30 ÷ 40 mA
- Vacuum: ~ 10^{-4} mbar
- Specimen type: Charpy V-notch and precracked Charpy
- Central insert size: 17 mm
- Specimen machining: Electro erosion discharge machine