



CEGAM

e-Workshop, PTB

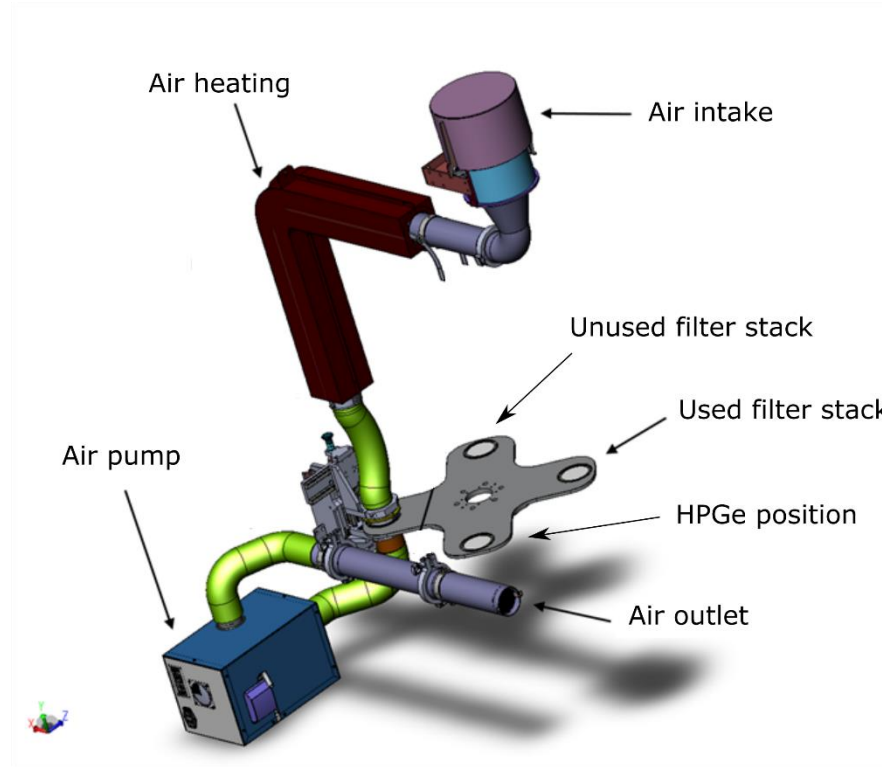
NUVIA CZ, CMI
December 10, 2020

- 📍 **Design and construction of CEGAM air sampling system**
- 📍 CEGAM = Continuous Environmental Gas Aerosol Monitor
- 📍 Transportable, fully automatic remote controlled operation
- 📍 Key components:
 - HPGe detector ORTEC IDM-200V, mechanically cooled, rel. efficiency 50%, FWHM 2.0keV for Co-60, lead shielding
 - Four-position sample changer, QR code scanner
 - Air pump NuRMS EGS, air flow 1 to 50 m³/hod., variable sampling time
 - Two stacks, for clean and deposited filters
 - Transportable container



Four position sample changer

- 1st position for uploaded clean filters
- 2nd position for deposition of filters
- 3rd position for measurement of deposited filters
- 4th position for unloading filters
- Controlled by PLC

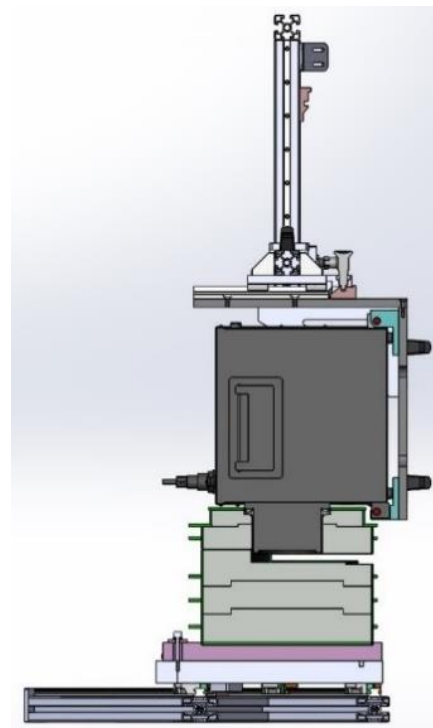




Stacks for stored filters



Detector Ortec IDM-200V



Detector in the shielding

Transportable container

- ◉ Easily transportable to a site
- ◉ Air conditioned
- ◉ Filtered ventilation
- ◉ Power supply 400 V
- ◉ LTE modem for remote access
- ◉ Meteo station
- ◉ GM tube for dose rate monitoring

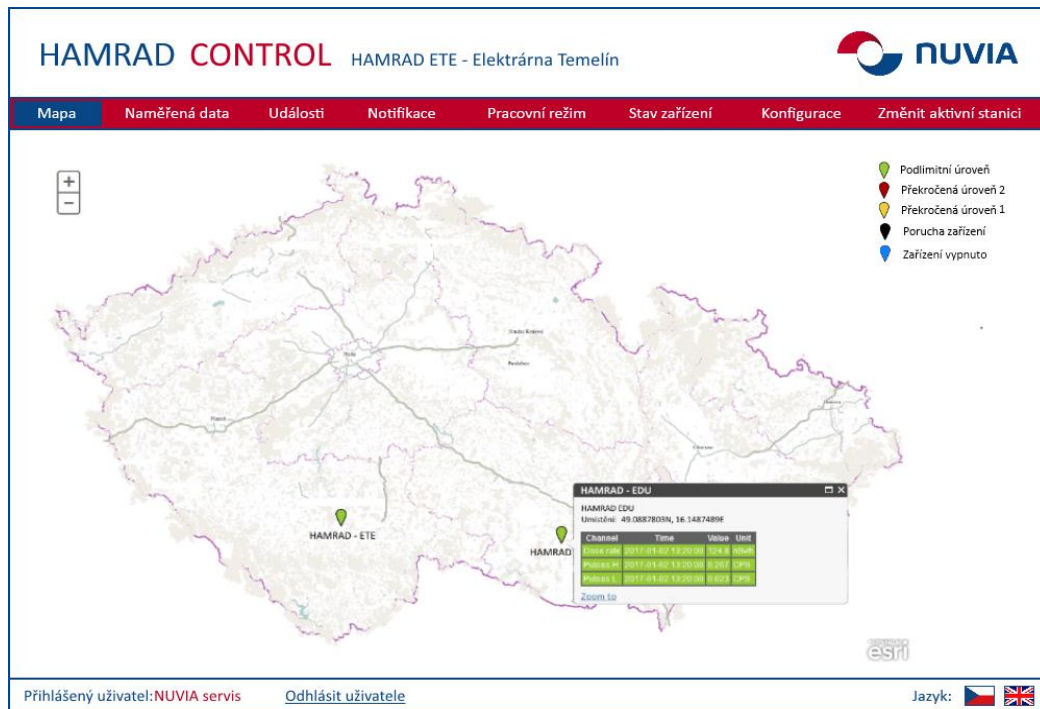


System control

- Sends commands to PLC
- Manual/automatic regime
- Definition of measuring sequence
 - Sampling interval
 - Sampling and measuring times
 - Air flow
 - Background measurement

Automatic data evaluation

- Gamma-ray spectra analysis
- Calculation of activity concentration in air [Bq/m^3]
- Final report writing



HAMRAD control system

- The CEGAM system was installed and tested over a year at the station monitoring surroundings of NPP Dukovany (CZ).
- Tested parameters
 - Stability of the remoted controlled operation; after some problems with the remote access occurring within the 6 first months, the system worked flawlessly
 - Measuring part stability; all parameters met conditions required by standard IEC 1452
 - Sampling part stability; after some problems with uploading and unloading filters during the 3 first months, the system worked smoothly
 - Background measurement with deposited filters (only natural radionuclides occurred in spectra); minimum detectable volume activities (calculated after the standard ISO 11929) for key artificial radionuclides (e.g. Co-60, Cs-137) were better than 1 mBq/m³ (sampling time 24 hours, measuring time 12 hours),