Continuous Emission Monitoring System Best Practices

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CEMS in Europe: Background

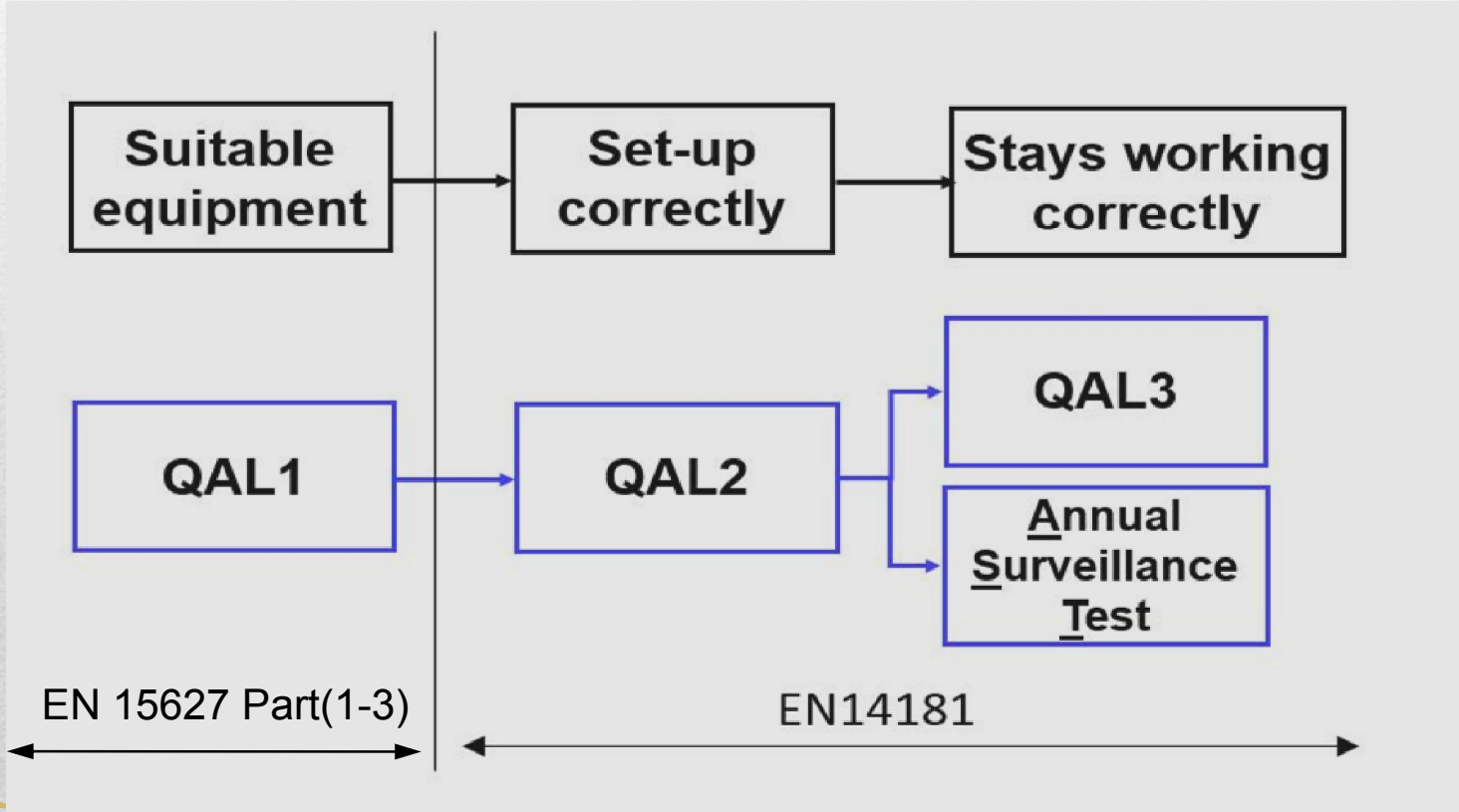
Well established CEMS framework in Europe , US etc. Other countries mostly follow the same.

In Europe, CEMS is known as Automated Measuring System (AMS), initially started in 1970s in power plants .

CEMS is mandatory in waste incineration and processing plants and large combustion plants under defined directives **Industrial Emission Directive (Directives 2010/75/EU).**

Well established quality check

EN 14181- Three Quality Assurance Levels and an Annual Surveillance Test have been formulated under this standard.



CEMS in Europe: Quality Check

QAL I - Quality assurance level I

- ✓ Done before installation
- ✓ MCERTS certification required as evidence of compliance with QAL1 (First version in 1997)
- ✓ The operator to ensure that specific site conditions do not reduce the performance below required standards
- ✓ To be performed by **Accredited test laboratory**

QAL II - Quality assurance level II

- ✓ Quality assurance of installation
- ✓ Calibration using Standard Reference Method (SRM)
- ✓ Uncertainty calculations
- ✓ To be performed by **Accredited test laboratory**

CEMS in Europe: Quality Check

QAL III - Quality assurance level III

- ✓ During operation
- ✓ To detect drift and changes in precision in the CEMS by performing regular checks
- ✓ Guarantee and Documentation of AMS Quality
- ✓ To be performed by **Process Operator**

AST - Annual surveillance test

- ✓ Yearly basis
- ✓ To check calibration carried under QAL2 is valid.
- ✓ Functional tests similar to QAL2, but using a smaller number of repetitions of the SRM

CEMS in Europe: Quality Check

Well defined data recording and compliance check system

- ✓ CEMS -> operator-> regulator
- ✓ Both pollution and operation data to validate
- ✓ Data sent are- real time, short term average, long term average, against stipulated norms and operational data

European Standard (EN 14181) specifies clear responsibilities

- ✓ CEMS manufacturer, supplier, lab, operator and regulator

Established guidelines for jobs to be carried by stakeholders

- ✓ CEMS manufacturer, supplier, lab, operator and regulator

CEMS in Europe

1970s: Under the Clean Air Act, 1970, USEPA published the **New Source Performance Standards** under which facilities were asked to install continuous monitoring systems to demonstrate continuous compliance.

1980: Requirements for CEMS installation, operation, and maintenance for SO_2 and NO_X was mandated for electricity utility.

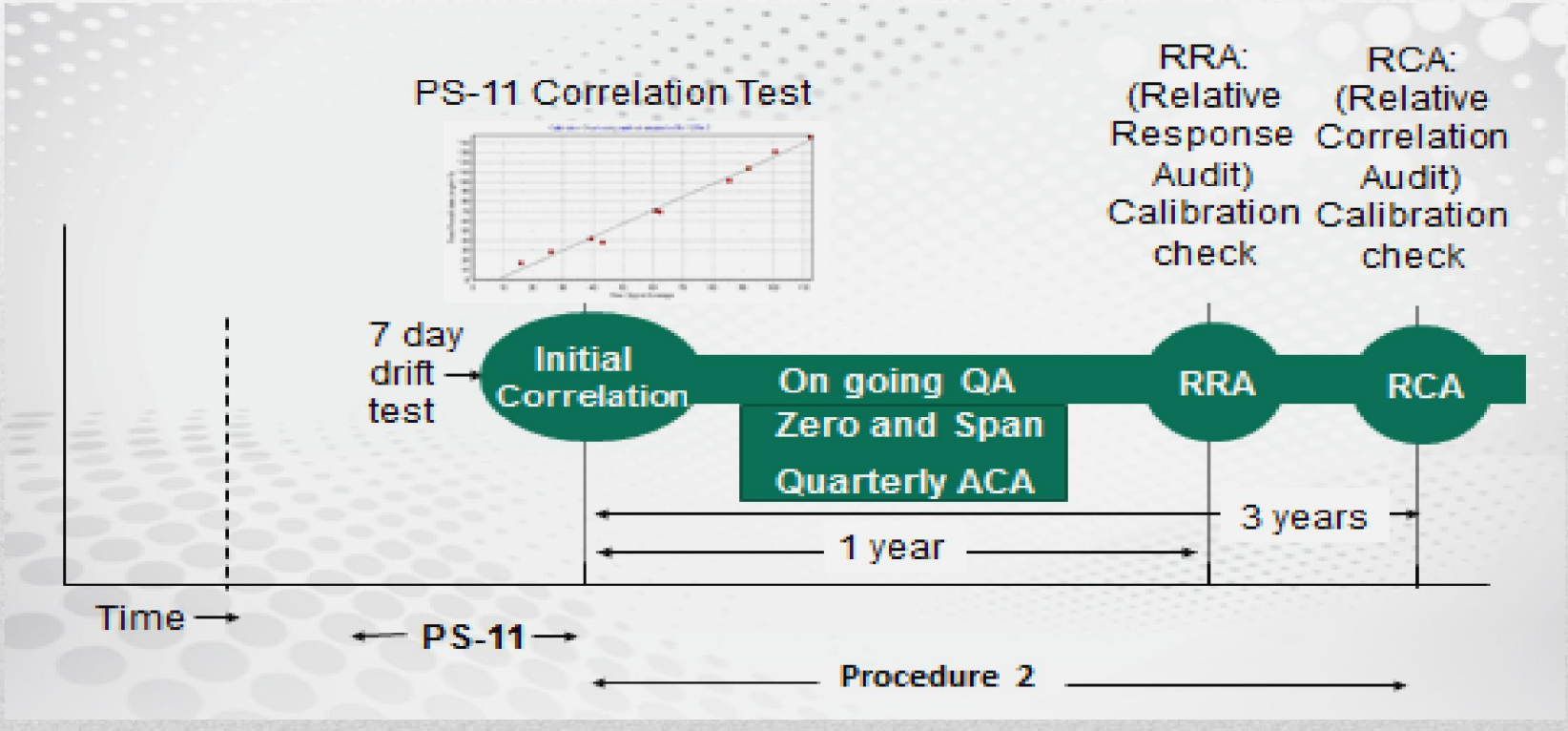
1987: Published quality assurance requirements of CEMS

1990s: CEMS was started being used for monitoring and compliance with emission standards and in **Acid Rain Programme** (ARP) for emission trading for power sector.

CEMS in USA

Strict quality check: each installation undergoes the parameter-wise tests for performance specifications contained in Title 40 CFR 60, Appendix B, Part 75

- ✓ During installation
- ✓ Recertification on modification that can affect performance



CEMS in USA: Quality Check

Continuing / periodical Quality Assurance (QA) Testing- to assure operation and maintenance

Established data monitoring & collection cycle

- ✓**PM:** Average value for 6 minutes cycle is collected
- ✓**Gaseous Pollutants**: Every 15 minutes

Established compliance check system

- ✓**PM:** Minimum total time of compliance check is 3 hours. Shall not exceed 20 % opacity except one 6 minute period/hr not exceeding 27 % opacity.

- ✓**Gaseous pollutants:** 30 days rolling average basis

CEMS in USA

Improved air quality. Emissions from power sector declined since 1995.

Emission reduction between 2005 and 2015

- ✓ **NO_X emissions have declined by 62%** (from 3.4 million metric tons to 1.3 million metric tons).
- ✓ Power sector **SO_2 emissions have declined by 78%** (from 9.3 million metric tons to 2.0 million metric tons).

CEMS in USA: Huge Benefits

Best Practices observed in Germany

CSE's training cum exposure visit to Germany for regulators to understand the best practices and framework for CEMS.

No generalized approach for technology selection. It is based on the type of industry, process and flue gas characterization.

The data acquisition and handling software is provided with the device as a package.

Sector-specific directives and clear standards/ regulations is a necessity.

Roles and responsibilities are clearly defined.

- ✓ Quality of the product and certification - Manufacturer
- ✓ Installation, O&M - Supplier and Industry
- ✓ Compliance - industry
- ✓ Compliance check - Regional environmental agency.

Key Learnings from Germany

Certification and quality assurance of a CEMS device by a competent agency is mandatory.

Industries install CEMS devices before and after pollution control equipments. Installing before treatment checks for any malfunction and level of treatment required


Environment, health and safety are prime concerns for German industries.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CEMS data is seen in conjugation with plant's key operational data. German industries consider CEMS data complementary to a plant's operational data as it helps in optimization of the process.

Thank you