

Webinar on Commercial Grade Dedication

European Industrial Alliance on SMRs

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INDEX



1. <i>Introduction to Tecnatom/Westinghouse</i>
2. <i>Approach to CGD</i>
3. <i>References & Regulations</i>
4. <i>Dedicated items</i>
5. <i>Experience and challenges</i>

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CGD for Westinghouse



- ❑ Significant safety equipment engineering related work for NPP's:
 - For all the plants (PWR & BWR).
 - For all kind of equipment (mechanical, electrical, I&C).
 - Dedication works (including Environmental and/or Seismic Qualification).
 - Qualified life extension for no longer available original equipment, including alternative spares generation from CGI.
 - Supply of new alternative Dedicated equipment or spares.
- ❑ Large range of dedication or qualification work for relevant foreign clients: France, UK, Belgium, Germany, Italy, Sweden, Argentina, Bulgaria, Czech Republic, Slovenia, Slovakia, Ukraine...

2. Approach to CGD

Process

The acquisition and use of a CGI as a basic component must comply:

- ✓ Justification, documented, of its use as an alternative to the components acquired as a nuclear class,
- ✓ Implementation and verification of the validity of the dedication process, and
- ✓ Documentation that the component has passed the dedication process.

The above requirements are carried out by developing the two basic activities that make up the dedication process:

- **Technical Evaluation** Process: to determine the safety function, to establish the requirements to be fulfilled and to evaluate its capacity to satisfy these requirements.
- **Acceptance** Process: to verify and document through different methods the compliance with the established requirements.

2. Approach to CGD

Technical Evaluation Process

- Necessary if: design modifications, or replacement and replacement of components.
- Not required if: repetitive purchases of previously evaluated identical components.
- The different stages of a Technical Evaluation process are as follows:
 1. Classification and functional analysis of the component,
 2. Analysis of effects and failure modes,
 3. Determination of design characteristics,
 4. Obtaining the design characteristics,
 5. Evaluation of the characteristics of the new component,
 6. Definition of technical and quality requirements.

2. Approach to CGD

Acceptance Process

- A set of actions which, once executed and documented, provide reasonable assurance that the item purchased meets the requirements of the specification and will operate successfully.
- Critical characteristics. As a subset of the design characteristics to be chosen, the following must be considered:
 - ✓ Product identification,
 - ✓ Function and importance with respect to safety,
 - ✓ Mode of operation,
 - ✓ Complexity,
 - ✓ That these critical characteristics can be perfectly identified and measured.

2. Approach to CGD

Methods

- Four acceptance methods are defined:
 - Special Tests/Inspections (*Method 1*)
 - Commercial-Grade Survey (*Method 2*)
 - Source Verification (*Method 3*)
 - Acceptance Item/Supplier Performance Record History (*Method 4*)

Acceptance can be carried out using a combination of these methods.

Methods 2 and 4 need to be used in conjunction with another method.

3. References & Regulations

- EPRI 3002002982, “*Plant Engineering: Guideline for the Acceptance of Commercial-Grade Items in Nuclear Safety-Related Applications. Revision 1 to EPRI NP-5652 and TR-102260*”.
- RG 1.164, “*Dedication of Commercial-Grade Items for use in Nuclear Power Plants*”.
- EPRI TR-017218-R1, “*Guideline for Sampling in the Commercial-Grade Item Acceptance process*”.
- EPRI NP-6406, “*Guidelines for the Technical Evaluation of Replacement Items in Nuclear Power Plants (NCIG-11)*”.
- EPRI NP-6895, “*Guidelines for the Safety Classification of Systems, Components, and Parts Used in Nuclear Power Plan Applications (NCIG-17)*”.
- ASME NQA-1 (2019), “*Quality Assurance Requirements for Nuclear Facility Applications*”.

3. References & Regulations

- EPRI TR-106439, “*Guideline on Evaluation and Acceptance of Commercial Grade Digital Equipment for Nuclear Safety Applications*”.
- EPRI TR-107339, “*Evaluating Commercial Digital Equipment for High Integrity Applications: A supplement to EPRI Report TR-106439*”.
- 10 CFR 21, “Reporting of Defects and Non-compliance”.

Application in Spain

- UNE 73104 (1994), “*Guidelines for dedication of commercial-grade components in nuclear power plants*”.
- UNE 73403 (1995), “*Use of commercial grade items in safety related applications of nuclear facilities*”.

4. Dedicated items

➤ Examples of CG dedicated items:

- **Equipment:** actuators, circuit breakers, compressors, transformers, filters, gauges, indicators, partial discharge sensors, pressure controllers, pushbuttons, recombiners, relays, valves.
- **Components:** bearings, belts, brushes, bushes, cable glands, cables, capacitors, coils, connectors, couplings, engine parts, fuses, gaskets, locks, potentiometers, probes, resistances, resistors, shunts, springs, switches, terminal blocks, tiles, valve seats.
- **Materials:** oil, sealant paste, silicon fluid.
- **Services:** calibrations, testing...



4. Experience and challenges

- Cases of interest:

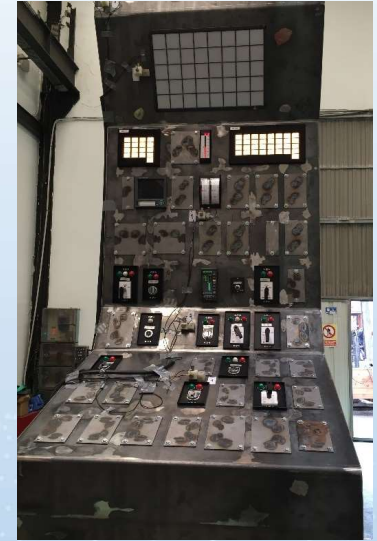
Dedication of MCR & ECR instrumentation (USA/China)

Design, manufacture, Dedication (including Qualification) and commissioning of Main and Emergency Control Rooms, for nuclear power plants in China.

CGID of hundreds of components as cables, connectors, fuses, analog and digital meters, pushbuttons, relays, switches, tiles, displays were dedicated.

Works related:

- 1) Selection of the item suppliers.
- 2) Dedication plans for each component.
- 3) Performance of Surveys to supplier and sub-suppliers.
- 4) Qualification of instrumentation panels.
- 5) Issue of Dedication Documents.



4. Experience and challenges

- Cases of interest:

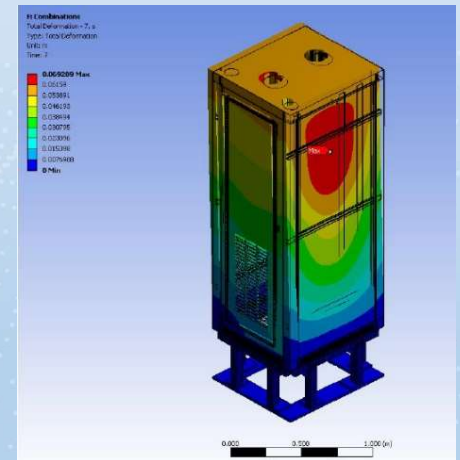
Dedication of ECR instrumentation (Slovenia)

Design, manufacture, qualification and commissioning of the NPP emergency control system, designed to mitigate accidents outside the design basis (severe accidents).

Dedication of special control hand-switches, assembled modules, PLC cabinets, cables, thermomagnetic circuit breakers, LEDs, connectors, pushbuttons were dedicated.

Within the scope was included:

- 1) Selection of the item suppliers.
- 2) Dedication plans for each component.
- 3) Qualification of instrumentation panels.
- 4) Issue of Dedication Documents.



4. Experience and challenges

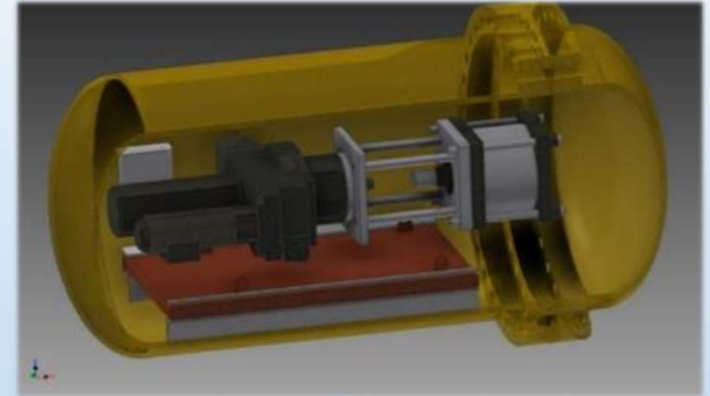
- Cases of interest:

Actuators for Spanish NPP

Design support, qualification and CGID of an electrical linear actuator and a power electronic unit, for its use in safety lines located in the Containment Blg.

Works related:

- 1) Dedication Plan.
- 2) Survey to the actuator and motor manufacturers.
- 3) Design modifications to withstand the radiation and temperature conditions.
- 4) Design modifications to withstand the EMC tests.
- 5) Activities to ensure the same manufacturer and batch for seals, gaskets, bearings and grease.
- 6) Qualification including functional, mechanical, thermal, irradiation, vibration, seismic, EMC and DBA tests.
- 7) Issue of Dedication Documents (acceptance methods 1 & 2).



4. Experience and challenges

- Cases of interest:

Time relays for Spanish NPPs

CGD of time-relays (several models and different coil supply voltages).

Equivalence analysis of the relays installed in the Spanish NPPs, in order to validate the new range of relays and their accessories as alternatives to the original ones.

Within the scope was included:

- 1) Comparative analysis of interchangeability and functional equivalence.
- 2) Comparative analysis of interchangeability and physical equivalence.
- 3) Technical documentation to support the family of relays, bases and fixing systems.
- 4) Testing: physical, functional, electrical, EMC and seismic tests.



Gracias Thanks



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WPB Non-OEM Equipment Qualification & CGD