



# MDEP Activities, Achievements, and Challenges in Codes Harmonization

## Codes & Standards Working Group (CSWG)

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## CSWG Members & Cooperation organizations

- ❖ CSWG members: Canada, China, Finland, France, India, Japan, Korea, Russian Federation, South Africa, Sweden, the United Arab Emirates, the United Kingdom, and the United States.
- ❖ Technical secretariat: OECD Nuclear Energy Agency (NEA)
- ❖ Cooperation organizations: the Standard Development Organizations (SDOs) and WNA Cooperation in Reactor Design Evaluation and Licensing (CORDEL) working group.
  - SDOs: ASME (US), JSME (Japan), KEA (Korea), CSA (Canada), AFCEN (France), and NIKIET (Russia)
- ❖ IAEA takes part in the CSWG meetings.

## CSWG Goal

Promote harmonization of code requirements for the design and construction of pressure-retaining components in order to:

- Improve the effectiveness and efficiency of design review and construction oversight;
- Enhance Nuclear Power Plant (NPP) quality and safety;
- Support the regulators in making decisions on safety.

# Code Harmonisation Definition

**Harmonization = Convergence + Reconciliation**

**Harmonization:** a process by which convergence or reconciliation of differences in code requirements can be achieved in order to ensure an acceptable level of quality and safety in nuclear power plants.

**Convergence:** to establish the same or equivalent code requirements in order to reduce the areas in codes identified as “different”.

**Reconciliation:** to accept or conditionally accept differences in code requirements by justifying their sufficiency in ensuring safety and reliability.

## The Challenges

- ❖ Codes are highly integrated; a provision usually is related to, or conditioned on, many other provisions. Code needs to be considered as a whole package.
- ❖ Codes consider all safety aspects, and balances or optimizes all safety requirements. “The better, the safer” is not always true in reactor design.
- ❖ Codes reference many other industry standards which are different from country to country.
- ❖ Codes embed the background of culture and human performance, which are different in each country and are not fully documented.
- ❖ Regulatory requirements can result in code variation, and also supplement code requirements. Each country has an unique regulatory system.
- ❖ The industry is deeply invested in current practice.

## Activities in Code Harmonization

- ❖ Develop documents to guide code harmonization.
- ❖ Perform code comparisons to identify the extent of similarities and differences among the international codes.
- ❖ Harmonize code requirements, which includes **convergence** and **reconciliation** of code differences, and **minimization of further code divergence**.
- ❖ Assess the effect of code application (how code is applied to components) on design and manufacturing of nuclear components.
- ❖ Support the development of code content and technical bases to be shared between SDOs.

## Achievements

- ❖ CSWG has established a general approach for code harmonization and established a regular communication process for information exchange and discussion.
  
- ❖ CSWG has issued the following documents:
  - 1) TR-CSWG-01 - Regulatory Frameworks for Use of Codes & Standards in MDEP countries;
  - 2) TR-CSWG-02 - Lessons Learnt on Achieving Code Harmonization;
  - 3) TR-CSWG-03 - Fundamental Attributes;
  - 4) TR-CSWG-04 - Essential Performance Guidelines;
  - 5) CP-CSWG-01 – Findings from Code Comparisons and a Global Framework towards Code Harmonization.

- ❖ CSWG has also discussed other topics, including:
  - 1) Strategies for code reconciliation;
  - 2) Effect of code classification on NPP design and construction; and
  - 3) Supplementary regulatory requirements to codes or standards.
- ❖ CSWG has encouraged the SDO Code Convergence Board in working to minimize further code divergence during code update, and to achieve convergence on requirements where realistic and practical.
- ❖ CSWG supported the SDO Board in preparing:
  - 1) ASME STP-NU-051, Code Comparison Report for Class 1 Nuclear Power Plant Components; and
  - 2) ASME STP-NU-078, Comparison Report on Welding Qualification and Welding Quality Assurance.



- ❖ CSWG has provided support and feedback for CORDEL efforts in code convergence.
  - 1) CORDEL has compared the requirements in the major nuclear design codes and compared the current international industrial practices in NDE personnel certification, and recommended a harmonized international alternative for the certification of NDE personnel.
  - 2) CORDEL is preparing a series of reports for converging code requirements on non-linear analysis.
  - 3) CORDEL has proposed to prepare a series of reports concerning fatigue analysis.

## Use of Code Harmonisation Results

- ❖ SDOs stated that the MDEP work has resulted in the SDOs talking to each other, and becoming aware of other SDOs' code development activities, which is effective in preventing further code divergence.
- ❖ MDEP code reconciliation results have been used in licence review of new reactor designs.
- ❖ A SDO is developing codes based on comparison report ASME STP-NU-051, and introducing new areas that are not covered in its codes.
- ❖ A regulatory authority is using comparison report ASME STP-NU-078 to draft proposals for modifying its regulatory requirements.

- ❖ The proposed NDE personnel certification rule has been used in two countries: certificated personnel in one country can submit certification application to another country without additional certification test or examination.
- ❖ A SDO which requires company-based certification program intends to modify its code and accept the new third-party certification rule proposed for NDE personnel certification.
- ❖ Proposed CORDEL technical bases enhance Codes in important areas where users have had to rely on custom analysis.

## Conclusions

- ❖ The MDEP CSWG has closely worked together with the WNA CORDEL group and the SDOs in code harmonization, and obtained significant achievements.
- ❖ The code harmonization results from the MDEP, SDOs and CORDEL are now being used in code development, regulatory document development, and licence review of new reactor designs.
- ❖ Code harmonization is very valuable but is challenging long-term work. Its success is strongly dependent on global cooperation among the nuclear industry (CORDEL), the SDOs and the regulatory authorities.