Multinational Design Evaluation Programme (MDEP)

Issue Specific - Codes and Standards Working Group (CSWG)

Xuejun Wei, Chair-CSWG
Canadian Nuclear Safety Commission

Contents

- *CSWG Members & Cooperation organizations*
- *CSWG Ultimate Goal*
- *General Approach, Work Plan, and Activities*
- *Status/Achievement*
- *Conclusions*

CSWG Members & Cooperation organizations

- CSWG members: the United States, Japan, France, Finland, Russian Federation, Korea, the United Kingdom, South Africa, China, and Canada.
- Technical secretariat: OECD Nuclear Energy Agency (NEA)
- Cooperation organizations: the Standard Development Organizations (SDOs) and WNA CORDEL working group.

  SDOs : ASME, JSME, KEA, CSA, AFCEN, and NIKIET (as the Russian designated organization to carry out the Code comparison)

- IAEA takes part in the CSWG meetings.

CSWG Ultimate Goal

- CSWG ultimate goal is harmonization of code requirements for design and construction of pressure-retaining components.

- CSWG preliminary definitions:

Harmonization: Establishing a framework for convergence and for reconciliation of differences in code requirements.

Convergence: Increasing the areas identified as same or equivalent while reducing the areas of difference.

Reconciliation: Developing MDEP positions for mutual recognition of differences.

General Approach

- General Guidance and Common Code Aspects – *Current Focus*

  Referenced as an international basis in:

  1) Studying the possibility of using a foreign code;
  2) Preventing further code divergence;
  3) Developing/maintaining technical regulatory guidelines in each country.

- Harmonization of Code Requirements – *Current Focus*

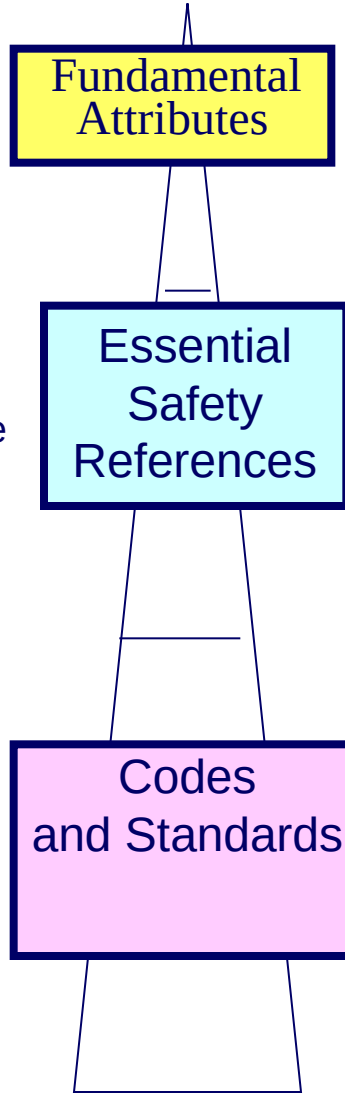
  1) Convergence is limited to technical differences. Convergence of administrative differences is very difficult as they have cultural, historical, industrial and legal backgrounds in each country.
  2) Administrative differences could be harmonized through reconciliation.

- Application of code to components – *In Consideration*

  1) Regulatory practice in using code
  2) Code classification of components

(Framework of Code Hierarchy)

Hierarchy



- Establishes overarching requirements (fundamental attributes) for the design and construction of nuclear power plant pressure-retaining components.

- The Essential Safety References can be developed through:
  1) Evaluating codes similarities, and identifying common essences;
  2) Analyzing codes differences, and identifying underlying common aspects;
  3) Assessing codes differences, considering the requirements of other code provisions and/or referenced standards, and then identifying actual common aspects.

- Converge code differences – stepwise approach
  1) Trial convergence: Help CORDEL/SDOs in identifying a few code requirements where differences have the most impact and are easier for achieving convergence; Solicit them to take a further step for converging these identified differences;
  2) Encourage SDOs to incorporate the converged portion into their own codes;
  3) Increase the areas of code convergence step-by-step.
- Prevent/minimize further divergence
- Reconcile code differences, and establish a process to use foreign codes

*1) **Fundamental Attributes** – Top level*

- Provides overarching requirements (fundamental attributes) for designing and constructing pressure-retaining components in nuclear power plants.
- Be developed through “top-down” approach starting from IAEA’s Fundamental Safety Objective: to protect people and the environment from harmful effects of ionizing radiation.
- Covers the areas of design, material, fabrication and installation, examination, testing, and over-pressure protection.

2) Essential Safety References – Middle level

- Establish mid-level guidance to identify the common code aspects.

- Be developed through "bottom-up" approach based on the evaluation and analysis of code similarities and differences:

  1) Evaluating code similarities, and identifying common essences;
  2) Assessing code differences, considering the requirements of other code provisions and/or referenced standards, and then identifying **actual** common aspects;
  3) Analyzing code differences, and identifying **underlying** common aspects.

- All codes comply with the Essential Safety References if fully implemented or supplemented with referenced industry standards.

3) Convergence of code difference – Bottom level

- Stepwise approach – for existing code:
  1) Trial convergence: Help CORDEL/SDOs in identifying a few code requirements where differences have the most impact and are easier for achieving convergence; Solicit them to take a further step for converging these differences. If succeed, then
  2) Encourage SDOs to incorporate the converged portion into their own codes
  3) Increase the areas of code convergence step-by-step

- CORDEL "Pilot Project" is coincidently similar to the 1st step of CSWG Convergence approach, the "Trial Convergence".

*4) **Prevent further divergence** – Bottom level*

- For revision of existing code

  Code is a comprehensive, living document that is continually being updated to incorporate the improved understanding and the accumulated operational experience. CSWG encourages SDOs to communicates with each other and develop a strategy to minimize the code differences during code revision.

- For development of new code

  Some countries are considering to develop their own codes. CSWG encourages these countries to study the existing codes carefully and minimize the potential differences between new codes and the existing codes.

5) Reconciliation of Code Differences – Bottom level

Reconciliation of code differences will be performed through the following approaches:

- Technical differences: reconciled by demonstrating that 1) The different requirements provide an equivalent level of quality and safety; or 2) A comparatively looser provision in one code is compensated by other more stringent provision(s) of the code, and the full implementation of the code still results in an equivalent quality and safety.

- Differences not addressed in one Code: reconciled by showing how the requirement is addressed elsewhere or justifying why it is not necessary.

- Administrative differences: reconciled by establishing MDEP positions for identifying which codes and/or rules are applicable under various scenarios.

Code Harmonization - Very Challenging Work

- Code is a very comprehensive document; an individual provision usually is related to, or conditioned by, many other provisions. Code needs to be studied or used as a whole package.
- Code considers all safety aspects, and balances or optimizes all safety requirements. "*The better, the safer*" is not always true in reactor design.
- Code references many other industry standards which are different from country to country.
- Regulatory requirements can result in code variation; regulatory requirements also supplement code requirements. Each country has a unique regulatory system.
- Code has the background of culture and human performance, which are different in each country and are not fully documented.

Status and Accomplishments

(including SDOs code comparison work and CORDEL effort on code convergence)

1. General Approach and Activity Plan

(*completed and on-going)*

- Established a general approach and developed a framework with 3-level hierarchy for achieving code harmonization.
- Established a regular communication process for information exchange and discussion.

SDOs noted in a meeting: the MDEP effort resulted in the SDOs talking to each other and becoming familiar with each other's code, code organizations, and code philosophy. All SDOs found this as an unexpected significant benefit from performing the code comparisons and discussing the differences.

2. SDOs Phases I & II Code Comparison

(close to completion)

- Phases I & II code comparisons in Canada, France, Japan, Korea and Russia are complete.
- ASME has integrated all code comparison reports and results into a Final Report.
- This Final Report is being reviewed to ensure consistency, and then agreed and endorsed by each SDO.
- The Final Report is expected to be available by the end of year 2011.

Significance of Code Comparison

- Identifies the extent of similarities and differences between each country's code to the ASME Code;
- Gives CSWG an insight into the background, history, and philosophy of each code;
- Provides a basis for CSWG to develop a general approach and a framework for achieving code harmonization;
- Represents the first step of many toward CSWG ultimate goal.

3. Fundamental Attributes and Essential Elements *(first draft developed)*

- See top level of hierarchy
- Will seek SDOs comments

4. Essential Safety References *(first draft developed)*

- See middle level of hierarchy
- Will seek SDOs comments

5. Converge Code Differences *(has started)*

- CORDEL pilot project for converging technical differences:
  - Select a few specific parts of the codes where the convergence is the most beneficial and needs the least effort
  - Choose independent experts to propose a "harmonised" version of the selected part of the code or to demonstrate equivalence of these specific parts
  - Results to be approved by the SDOs involved

- CORDEL is preparing a working plan for code convergence.

6. Prevent further divergence *(on-going)*

- CSWG sent letters to SDOs to encourage them to enhance communication and prevent further code divergence.

- CSWG is discussing with SDOs on a potential plan for preventing further divergence. SDOs plans to discuss this internally during code meetings and then develop a working plan.

- China is developing their own nuclear code; CSWG is trying to establish communication with Chinese SDO(s) in order to minimize the potential divergence of the Chinese future nuclear code from other codes.

7. Reconciliation of Code Differences *(on-going)*

- Study and assess code comparison results and reconcile some technical differences
- Invite experienced specialists to give presentations on how their countries use foreign codes
  - Finnish representative gave a presentation on how STUK uses foreign codes for stress analysis.
  - More presentations will be arranged in the future meetings with the purpose of obtaining some ideas on how the goal of reconciliation can be achieved.

8. Safety Classification of Components

(completed and on-going)

A summary, on how safety classification is affecting application of code, has been provided to the STC

9. MDEP document to describe the regulatory practices in using codes *(close to completion)*

Conclusions

- CSWG has established a general approach and developed a framework with activities or plans at 3 levels for code harmonization.
- CSWG is simultaneously working on 3 levels (fundamental attributes, essential safety references, and code/standards) toward code harmonization, and has obtained some preliminary results.
- SDOs code comparison for Class 1 components is close to completion; CORDEL code convergence has started.
- While currently focusing on code harmonization, CSWG is also considering some other issues with the application of code to components.
- Harmonization of regulatory requirements is a very challenging work, but we have an excellent team, and will continue working closely with SDOs and CORDEL to obtain some significant achievements.