Korean Perspective of SDP
<KHNP(Korea Hydro & Nuclear Power) case>

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II  KHNP Design Change Process

III  KHNP’s CM Software
1.0 Induction of KHNP

- Total Application of CMIS to Korean NPPs

<table>
<thead>
<tr>
<th>No.</th>
<th>Plant</th>
<th>Reactor Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shinhanul 1 - 2</td>
<td>APR-1400</td>
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<tr>
<td></td>
<td>ShinKori 3 - 4</td>
<td>APR-1400</td>
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<td>OPR-1000</td>
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<td>Shinwolsung 1 - 2</td>
<td>OPR-1000</td>
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<td>Hanul 3 - 6</td>
<td>KSNP</td>
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<tr>
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<td>Hanbit 3 - 6</td>
<td>KSNP</td>
</tr>
<tr>
<td>3</td>
<td>Hanul 1 - 2</td>
<td>PWR (Framatome)</td>
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<tr>
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<td>Hanbit 1 - 2</td>
<td>PWR (Westinghouse)</td>
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<tr>
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<td>Kori 2 - 4</td>
<td>PWR (Westinghouse)</td>
</tr>
<tr>
<td>4</td>
<td>Wolsung 1 - 4</td>
<td>CANDU</td>
</tr>
</tbody>
</table>

Nuclear Power Plant Status

- In operation: 25
- Operation halted: 1
- Under construction: 4

Graphic by Cho Sang-won

Source: The Korea Hydro & Nuclear Power
1.1 SDP Flowchart

➢ Design Change Phases

① Initial Scoping Phase
② Conceptual/Common Design Phase
③ Detailed Design Phase
④ Planning Phase
⑤ Installation / Testing Phase
⑥ Design Closure Phase
I. Standard Design Process

1.1 SDP Flowchart

- **Design Change Type**
  - **Initial Scoping Phase**
    - 1.1 Issue Owner
    - Develop Modification Request Form
    - Plant Health Process
  - 1.2 Determine Change Type
    - Design Change
    - Design Equiv. Change
    - Temp Mod
    - Commercial Change
  - Is initial scoping and plant Health Committee approval required?
    - Yes
    - 1.3 Project Mgr/Des Eng
      - Perform initial scoping study (if required)
      - PM Process/Eng Study
    - 1.4 Issue Owner
      - Plant Health Committee and Budget Approval
      - Plant Health Process
    - 1.4a Eng/Plant Mgr
      - Perform / Approve Advanced Work Authorization
  - No

- **Conceptual/ Common Design Phase**
  - 2.1 Develop Conceptual Design
  - Desire to implement at multiple plants?
    - Yes
    - 2.2 Engineering
      - Develop Conceptual Design with the design elements “common” to multiple plants
      - Approved/Issued Common Design Package (ready for site specific detailed design)
    - No

- **Detailed Design Phase**
  - 3.1 Engineering
    - Develop Document-Only Change Package per Utility procedures
  - 3.2 Engineering
    - Update Documents per Utility procedures
  - 3.3 Develop Design Equivalent Change Package
    - Approved/Issued Design Equivalent Change Package (ready for WO planning and Implementation)
  - 3.4 Develop Commercial Change Package
    - Approved/Issued Commercial Change Package (ready for WO planning and implementation)
  - Will the Design Change be temporary?
    - Yes
      - 3A Return from Design Change Package
    - No

1. Document Only Change
2. Commercial Change
3. Design Equivalent Change
4. Temporary Modification
5. Design Change
6. Item Equivalency Evaluation
1.2 Summary of SDP Flowchart

I. Standard Design Process

**Initial Scoping Phase**
- Modification Request
  - Change Type.
    - Doc. Only
    - 
  - Multiple Plant
    - Yes
      - Common Design Package
    - No

**Common Design Phase**
- Multiple Plant
  - Yes
    - Common Design Package
  - No

**Detail Design Phase**
- Design Equivalent Change Package
- Commercial Change Package
- Design Change Package
- Document-Only Change Package

**Planning Phase**
- Temp. Mod.
  - Yes
    - Schedule Work Order
    - Install Temp. Mod.
    - Remove Temp. Mod.
  - No
    - Schedule Work Order

**Installation/Testing Phase**
- Field Change
  - Yes
    - Update Documentation
  - No
    - Installation

**Design Closure Phase**
- 
- Closeout
2.1 KHNP’s Design Change Process

II. KHNP Design Change Process

Level 1
[SSC Temp. Mod.]

- Need a Modification
  - Temp. Mod.
    - Yes → Temp. Mod. Process
    - No → Physical Change

Level 2
[SSC Change]

- Physical Change
  - Yes → Design Equivalent Change
  - No → Design Change

- Design Equivalent Change
  - Yes → Equivalent Evaluation
  - No → Design Change Process

Level 3
[Non-SSC Change]

- SW Change
  - Yes → SW Configuration Management
  - No → Param. Change

- Param. Change
  - Yes → Parameter Change Process
  - No → Quality Class Change

- Quality Class Change
  - Yes → Quality Class Management
  - No → Document Change

- Document Change
  - Yes → Engineering Document Change Process
  - No → Yes
## 2.2 Scope of Design Change Process

<table>
<thead>
<tr>
<th>KHNP</th>
<th>SDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSC Temp. Mod.</td>
<td>Temporary Modification</td>
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<tr>
<td>SSC Change</td>
<td>Equivalent Evaluation</td>
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<td>Design Change Request</td>
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<tr>
<td></td>
<td>Design Change</td>
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<tr>
<td></td>
<td>Installation/Closeout</td>
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<tr>
<td>Non-SSC Change</td>
<td>SW Configuration Management</td>
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<td>Parameter Change Process</td>
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<td>Quality Class Management</td>
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<td>Engineering Document Change</td>
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3.1 SDP Software Expectation

- Promote/implement design sharing mechanism.
- Automate/streamline SDP Process Forms
- Flexible solution – Tailor to existing software
- Automated final records capture
- Output Key Performance Indicators to measure SDP effectiveness

- SSO (Single Sign On) for users
- Provides EC cloning capabilities
- Automatically creates reviews based upon results of the Design Attribute Review (DAR)
- Allows Stakeholders (other departments) to provide direct input to EC Sections
- Interfaces with existing Utility software to feed source data to SDP
• Promote/implement design sharing mechanism.
• Automate/streamline SDP Process Forms \textit{(Electric Signature and workflow)}
• Flexible solution – Tailor to existing software
• Automated final records capture \textit{(Upload to Document management server)}
• Output \textit{Key Performance Indicators} to measure SDP effectiveness

• SSO (Single Sign On) for users
• Provides EC cloning capabilities \textit{(Provide waiting list and cloning basic info.)}
• Automatically creates reviews based upon results of the Design Attribute Review (DAR)
• Allows Stakeholders (other departments) to provide direct input to EC Sections
• Interfaces with existing Utility software to feed source data to SDP
• Integrated Solution for DBD management and FCI explorer
### 3.3 Scope of Design Change Process SW

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<td>Equivalent Evaluation</td>
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<td>Commercial Change</td>
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<tr>
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### Total Application of CMIS to Korean NPPs

<table>
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<th>No.</th>
<th>Plant</th>
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<td>4</td>
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<td>(2018.01)2018.08</td>
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</tbody>
</table>

![Total Application of CMIS to Korean NPPs](image-url)
3.16 Benefits of SILKROAD CMIS

- Improvements

  - Integrated Change Management Support (Design Change, Temporary Change, Document Change, SW Configuration Management etc.)
    - One-Stop services for Design change process
  - Provides Dashboard that Indicates Various Statistics
    - Various Technical Analysis
  - Digitalization of Entire Change Document Format
    - Minimization of Human Error
  - When Registering Documents, Linking Data and Assigning Approval Line can be done by “One-Step”
    - Easy to do change management
  - Systematic Drawings Version Control and Prevention of Simultaneous Design Change on the Same Drawing
    - Hard Version Management
3.17 Future Works

CM Performance Indicators (related to ECs)

Integrate Equivalency Evaluation Process
Thank you!