Challenges of I&C Commissioning to First AP1000 Unit

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I&C System Architecture

AP1000 I&C System Conceptual Architecture

Plant Components

PMS
PLS
DDS
IIS
RCS
RPI
PLS

OCS

MCR

Gateway (1 of 4)

Historian

EOF
OSC
TSC

EOF

To Site Management Level

Dedicated Safety panels
Operator Console

DAS Panel
SRO Console

MCR

(one of two)

RSR

LCS

(one of many)

Servers

SMSS

DAS

Plant Components

IIS
RPI
RCS

NS&I
BOP Controls

TOS

RT
ESF
QDP
NSSS and BOP Controls

N9S

Reactor Trip Breaker

To PMS

To DAS

Wall Panel

MCR

(two of many)

PMS

TO

DAS

OCS

(1 of 4 Divisions)

Reactor Trip Breaker
Challenges of Design Changes

- Due to the delay of design finalization and deficiencies found by site commissioning, Sanmen Unit1 PMS experienced 3 times of baseline update.
  - Re-performing of commissioning test.
  - Regression test.
  - Increase work load.
  - Delay commissioning schedule.
Challenges of Test

• New Test Procedures:
  – Dry run: verify executability.
  – Revision: due to design change.

• New Test Method:
  – Once changed, need to change procedure accordingly.
  – Need support from supplier.
Challenges of Knowledge/Skill

• PMS is more complex and has more functions than before, which requires more knowledge/skill of the commissioning personnel.
  – Automatic test method: need to develop not only procedure, but also scripts/test code.
  – Multiple interface: need knowledge covers not only PMS, but also related systems.
  – Prevention of spurious actuation: LOTO not only for PMS tests, but also for related systems and tests.
  – Temporary change control: impact analysis not only for PMS, but also for related systems.
Challenges of Environment Control

• Digital I&C system requires better environmental control: Temperature, Humidity, Dust.
  – Installation prerequisites: room condition properly maintained.
  – Temporary AC and dehumidifier: use as necessary.
  – Structure/HVAC design change: make room condition poor.
Thanks