Introduction to Concurrent Engineering
Grant Prince
Once the plant is operating it does NOT stand still – change is a fact of life

Multiple changes are planned to be executed either at planned shutdown/turnaround, or during maintenance outages

Projects can range from small field executed changes, small capital projects involving local field engineering support or major capital execution

All involve some variant of the same information which if not maintained requires costly walkdown and recreation steps

The operating basis, license/regulatory basis, engineering basis, safety basis… must converge or be consistent to ensure continued risk free operation
SPF 2008 - Concurrent Engineering
A perennial problem for operating plant

- Has been referred to as “Project / As-built” and utilizes SPF’s inherent and enhanced configuration management capabilities

- Concurrent Engineering provides the ability to manage multiple engineering projects executing concurrently which are associated with an operating plant and that potentially utilize the same scope of information.

- Managing change (the ever evolving ‘configuration’ of the plant)
  - Isolating change from a design basis until execution
    - Multiple level (plant-projects, project-workpacks etc)
  - Managing concurrent change
    - Shared design basis
    - View effects of change and parallel changes
    - Conflict resolution
  - Supporting design alternatives
    - Put options on hold
    - History retention and archiving
  - Controlled update of design basis on execution

- This requires the ability to process long term transactions that may span days, weeks or months, as opposed to short term transactions typically supported by a database, while maintaining control of the records.

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‘Simple’ Concurrent Engineering Example

The ‘as-built’ record

Local engineering plans to install bypass

Local maintenance plans to install drain

Remote capital engineering plans debottleneck/expansion which involves new equipment
What is Concurrent Engineering?

- Managing change (the ever evolving ‘configuration’ of the plant)
  - Isolating change from a design basis until execution
    - Multiple level (plant-projects, project-workpacks etc)
  - Managing concurrent change
    - Shared design basis
    - View effects of change and parallel changes
    - Conflict resolution
  - Supporting design alternatives
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Process Overview

The ‘as-built’ record

PlantA (=design basis)

Local engineering plans to install bypass

Project1

Re-Design

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Process Overview

The ‘as-built’ record

**Plant**A (=design basis)

Local engineering plans to install bypass

- Process Engineer

Local maintenance plans to install drain

- Maintenance Engineer

Project 1

Email notification of design basis change

Max flow = 45 kg/s

Add drain

Max flow = 30 kg/s

Max flow = 45 kg/s

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Process Overview

The ‘as-built’ record

PlantA (=design basis)

Local engineering plans to install bypass

Process Engineer

P-101
Max flow = 45 kg/s

P-101
Max flow = 30 kg/s

View conflicts
- Pull down data or accept project values
- Manually update drawing

Project1

P-101
Max flow = 30 kg/s

P-101B
Max flow = 30 kg/s

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Additional Controls

- **Claim**
  - Exclusive claim prevents parallel changes
    - System level control
    - User preference (if not turned on at system level)
    - Can be set individual objects or documents
  - Explicit claim forces users to claim before making changes
    - If not set, editing in a project claims on the fly
    - System level and user preference

- **Unclaim**
  - To remove a claim in a project
    - Different to terminating a claimed object which terminates at the plant on merge

- **Security**
  - Roles and role assignments replace 2007 plant and project lists

- **Scope**
  - Query across multiple projects
  - Project only view to hide as-built “clutter”
Performing the Engineering change

The ‘as-built’ record

Local engineering plans to install bypass
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Setting working scope

- Set active scope to Project 1

The ‘as-built’ record

Max flow = 45 kg/s

PlantA (=design basis) Rev B

Project1

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Claiming data to project

- Claim Equipment to Project
  - Sub (comprised of) tags automatically claimed
  - Connected (related to) tags optional
- Auto subscription to as-built

The ‘as-built’ record

- PlantA (=design basis)
- Rev B

- Project1

Max flow = 45 kg/s

P-101

Auto subscription to as-built
The ‘as-built’ record

PlantA (=design basis)

Project1

- Revise PID to Project
- Different Revision Scheme
- Perform design rework

P-101
Max flow = 45 kg/s

Rev B

P-101B
Max flow = 30 kg/s

Rev B01
Performing the Maintenance change

The ‘as-built’ record

Local maintenance plans to install drain
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Maintenance parallel change

The ‘as-built’ record

PlantA (=design basis)

Maintenance Project

- Set active scope to Maintenance Project

Max flow = 45 kg/s

Rev B

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Maintenance parallel change

- Claim Equipment
  - Notification of parallel project
- Revise PID
  - Parallel project revision supported

The ‘as-built’ record

PlantA (=design basis)

Maintenance Project

Max flow = 45 kg/s

Integrated operation limited to single project

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Merge maintenance change to as-built

The ‘as-built’ record

PlantA (=design basis)

Max flow = 45 kg/s

Maintenance Project

Rev B

- Merge back to as-built
  - Drain automatically selected

- Revision merged
  - New revision taken at Plant

Honouring revision schemes

Max flow = 45 kg/s

Rev B02

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Resolving differences

The 'as-built' record with the maintenance change

Local engineering plans to install bypass
Email / SPF notification of as-built change
- Due to claim – warning of parallel working
- Due to merge – design basis change

Object status
- Object is marked as having a conflict

PlantA (=design basis)

Project1

Max flow = 45 kg/s
The ‘as-built’ record

*PlantA* (=design basis)

*Project1*

- Email / SPF notification of as-built change
  - On Revise and Merge similar to tags
- Document and File Status
  - File check sum performed to determine if files have changed

Max flow = 45 kg/s

![Diagram of P-101 with Max flow = 45 kg/s]
Intergraph Asia Pacific 2008
Process Power & Marine
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