

Intergraph Asia Pacific 2008

Process Power & Marine

Introduction to Concurrent Engineering

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INTERGRAPH

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Hanoi, Vietnam

SPF 2008 - Concurrent Engineering

A perennial problem for operating plant

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- 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

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A perennial problem for operating plant

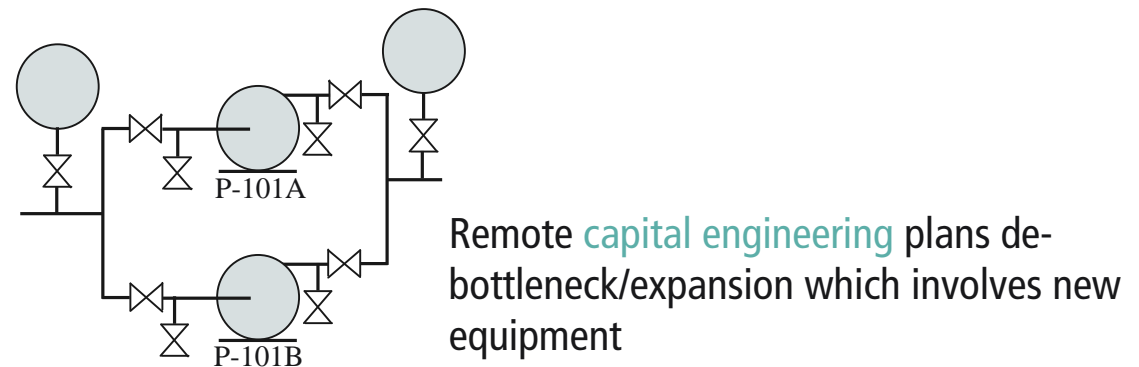
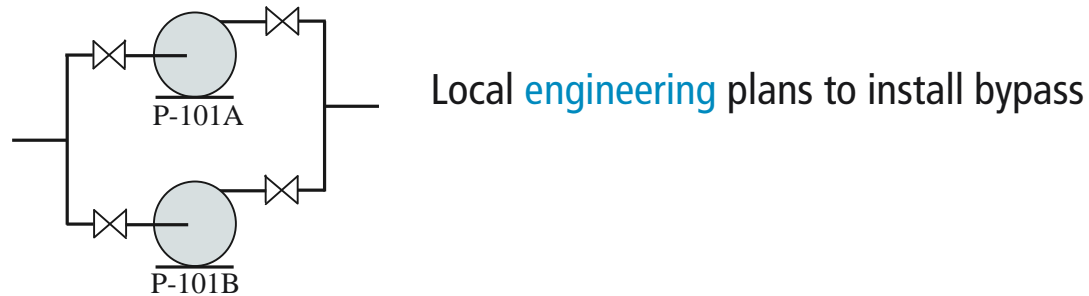
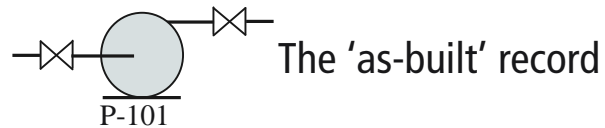
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- Has been referred to as “Project / As-built” and utilizes SPF’s inherent and enhanced configuration management capabilities
- Concurrent Engineering provides the ability to manage multiple engineering projects executing *concurrently* which are associated 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

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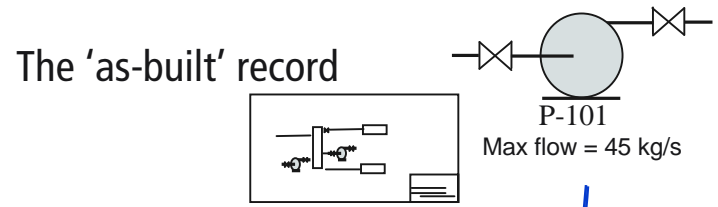
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What is Concurrent Engineering?

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- Managing change (the ever evolving 'configuration' of the plant)
 - Isolating change from a design basis until execution
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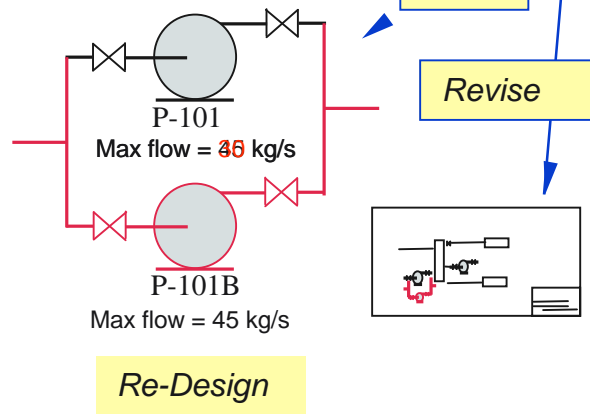
SPF 2008 - Concurrent Engineering Process Overview



PlantA (=design basis)

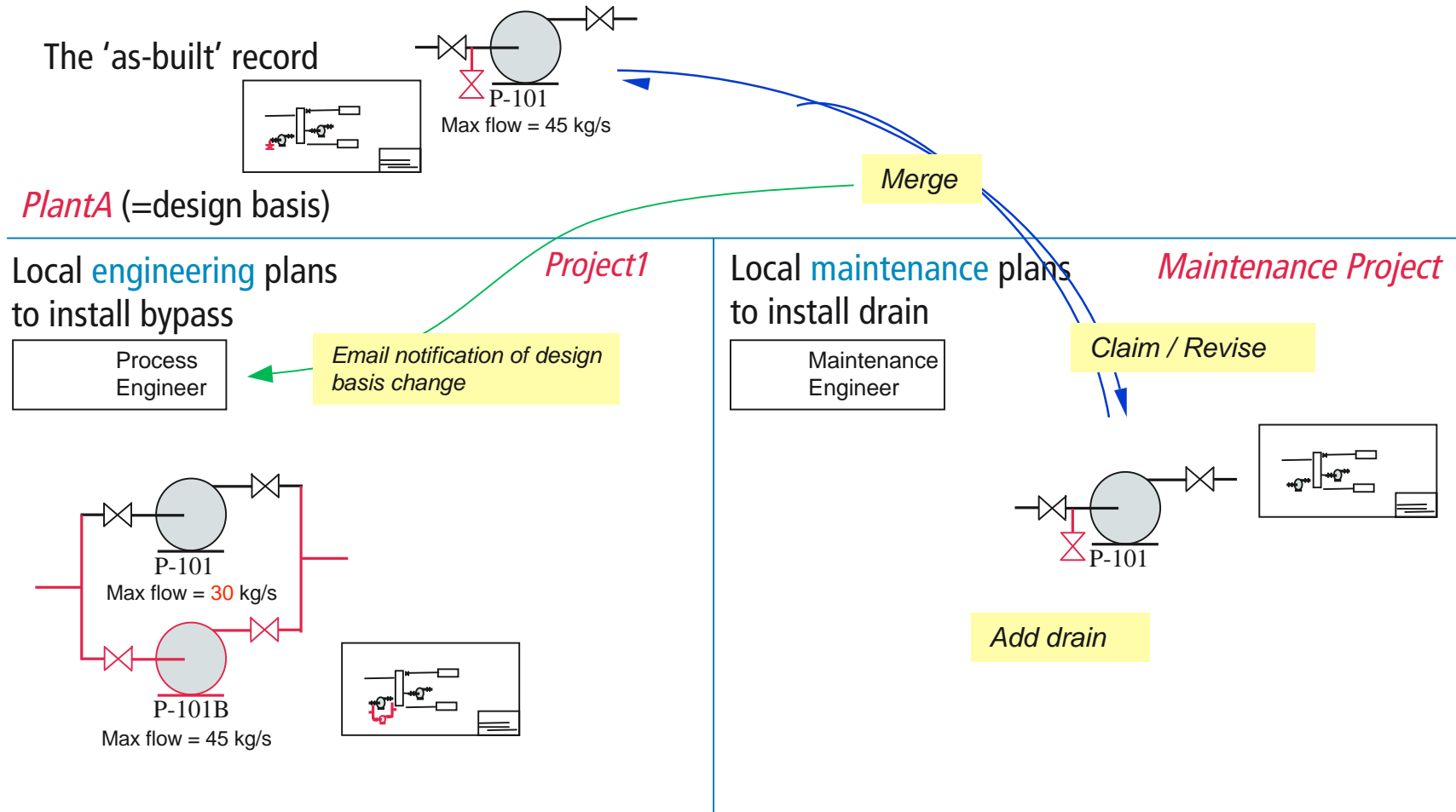
Local engineering plans
to install bypass

Process
Engineer



SPF 2008 - Concurrent Engineering Process Overview

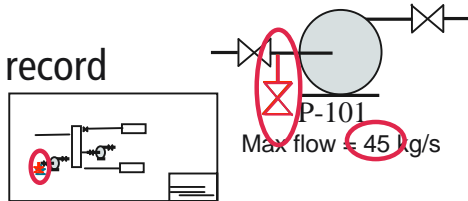
Process, Power & Marine



SPF 2008 - Concurrent Engineering Process Overview

Process, Power & Marine

The 'as-built' record



PlantA (=design basis)

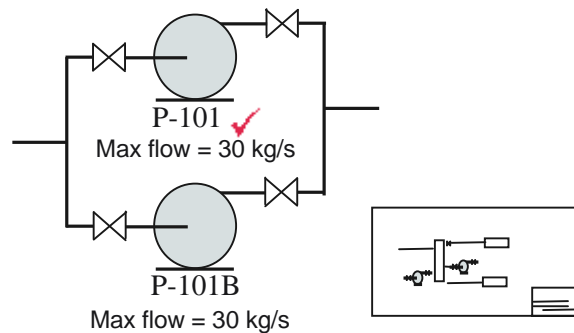
Local engineering plans
to install bypass

Process
Engineer

Project1

View conflicts

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



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Additional Controls

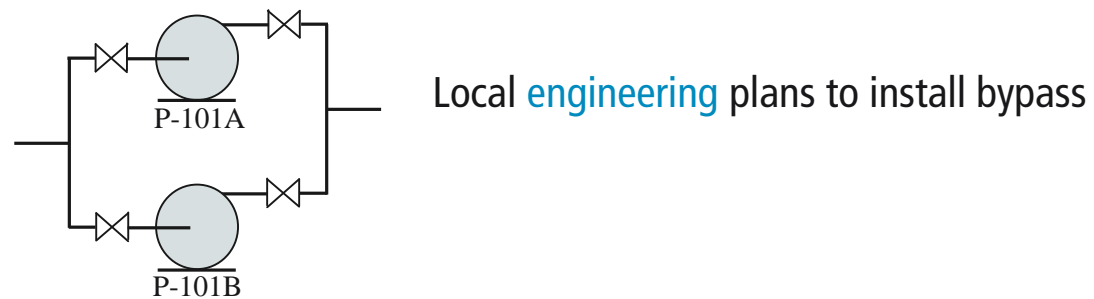
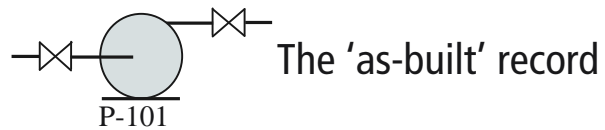
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- Claim
 - Exclusive claim prevents parallel changes
 - System level control
 - User preference (if not turned on at system level)
 - Can be set individual objects or documents
 - Explicit claim forces users to claim before making changes
 - If not 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”

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Worked Example

- Performing the Engineering change

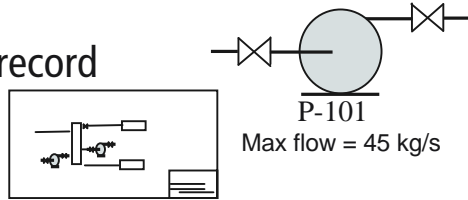


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Setting working scope

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The 'as-built' record

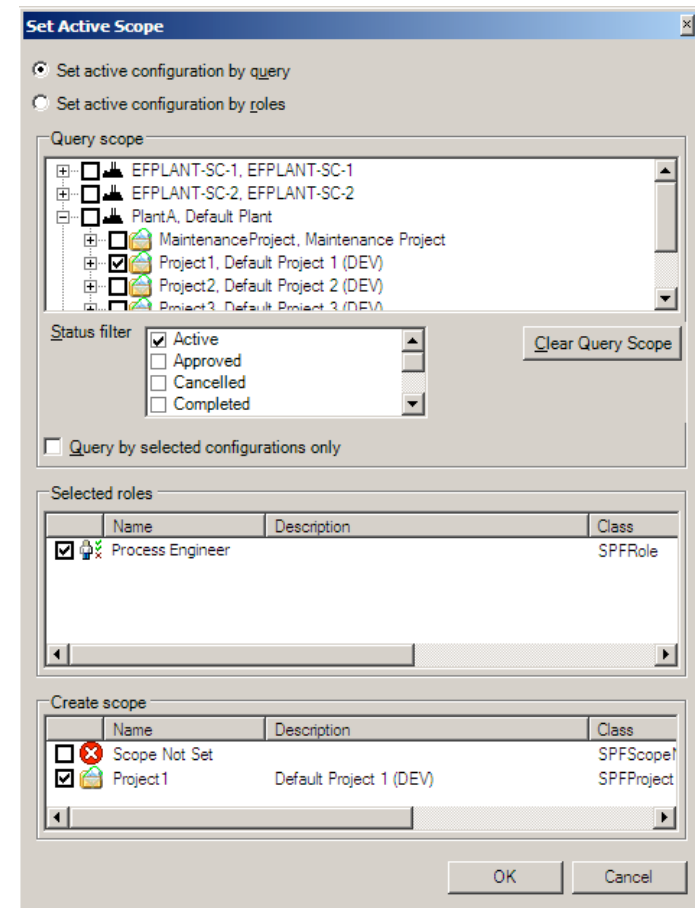


PlantA (=design basis)

Rev B

Project1

- Set active scope to Project 1

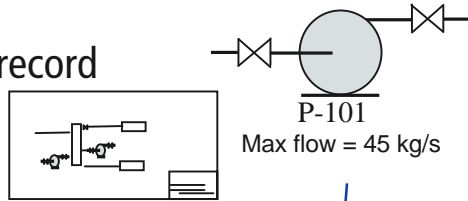


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Claiming data to project

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The 'as-built' record

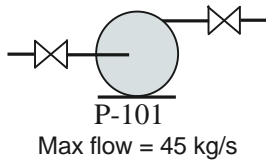


PlantA (=design basis)

Rev B

Project1

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



Claim

Claim to configuration: PlantA, Project1

Mandatory objects:

Name	Description	Class Definition
PA100	Pump Assembly	DEVTag
Claim	pump	DEVTag
	pump motor	DEVTag

Optional objects:

Name	Description	Class Definition
V146	gate valve	DEVTag
V145	gate valve	DEVTag

Manage All Subscriptions for Object PA100

Subscription settings

Event: Claimed, ClaimedTo, Deleted, EvCopied, EvCreated, EvTerminated, EvUpdated

Condition: [Dropdown]

Roles: [Dropdown]

Users: [Dropdown]

[Add] [Update] [Remove] [Remove All]

Event Name	Condition	User Name	Role Name	Creation Date
Claimed		superuser		13/05/20...
EvUpdated		superuser		13/05/20...
MergedTo		superuser		13/05/20...

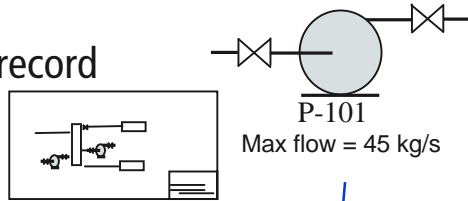
[OK] [Cancel]

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Revising documents to project

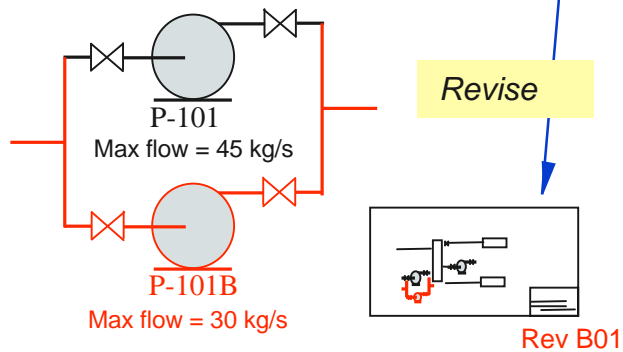
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The 'as-built' record



PlantA (=design basis)

Project1



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

Name	Description	Revision	Version	Class	Workflow Name
S20_A1P		B	1	P&ID	

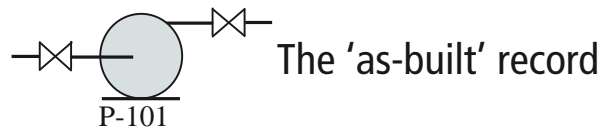
Revise S20_A1P		
Main details		
Name: *	S20_A1P	
Description:		
Details		
Status:	ISSUED	
Title:		
Design document revision details		
Notes:		
Revision details		
Revision scheme: *	RevA01	
Major revision: *	B	Next Major
Minor revision:	01	Next Minor
<input type="checkbox"/> Collapse sections automatically		
Collapse All Expand All Print < Back Next > Finish Cancel		

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Worked Example

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- Performing the Maintenance change

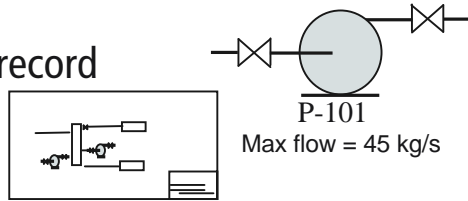


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Maintenance parallel change

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The 'as-built' record

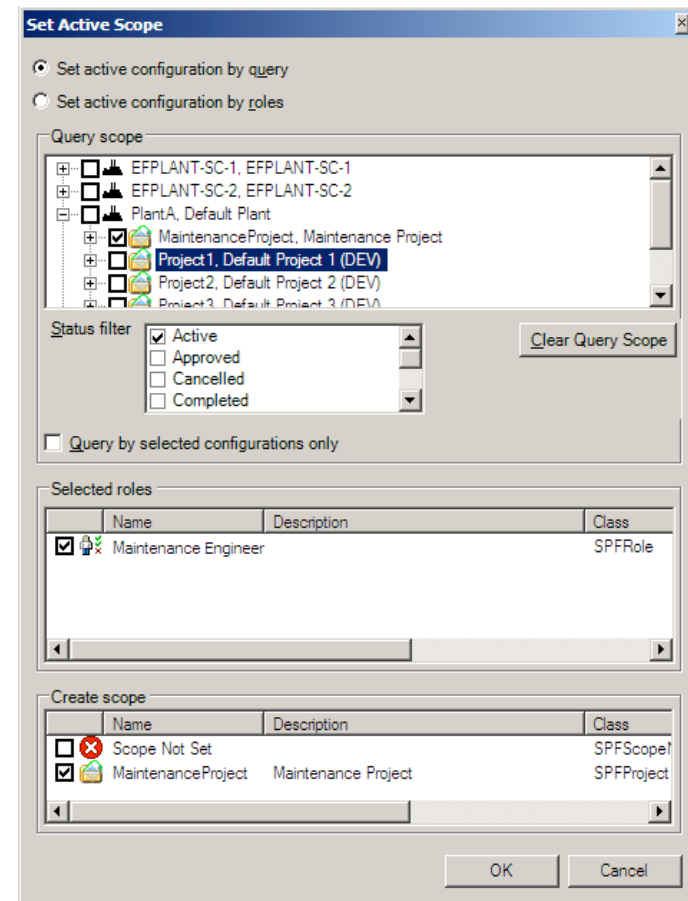


PlantA (=design basis)

Rev B

Maintenance Project

- Set active scope to Maintenance Project

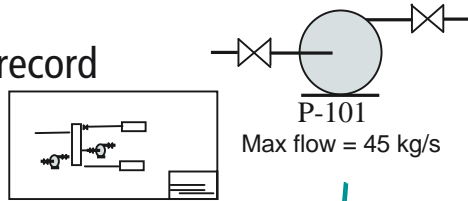


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Maintenance parallel change

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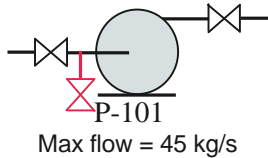
The 'as-built' record



PlantA (=design basis)

Maintenance Project

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



Claim

Claim to configuration: PlantA, MaintenanceProject

Mandatory objects:

Name	Description	Class Definition	Status	Previously Claimed To Configurations
PA100	Pump Assembly	DEVTag		Project1
P101	pump	DEVTag		Project1
M101	pump motor	DEVTag		Project1

Optional objects:

Name	Description	Class Definition	Status	Previously Claimed To Configurations
V145	gate valve	DEVTag		
V145	gate valve	DEVTag		

Rev B02

Select All Clear All
OK Cancel

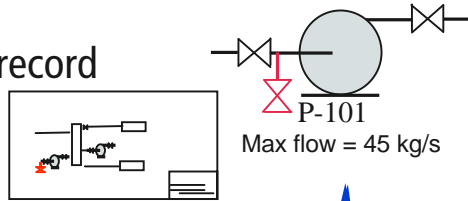
Integrated operation limited to single project

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Merge maintenance change to as-built

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The 'as-built' record

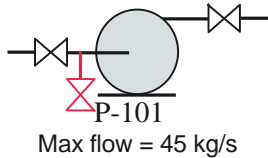


PlantA (=design basis)

Rev B

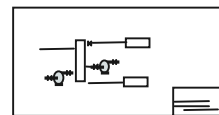
Maintenance Project

- Merge back to as-built
 - Drain automatically selected
- Revision merged
 - New revision taken at Plant
 - Honouring revision schemes

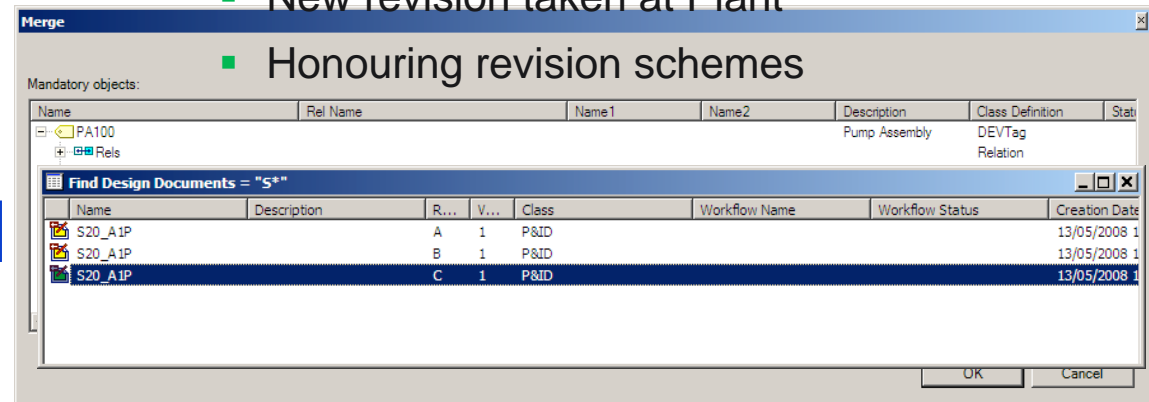


Merge

Merge



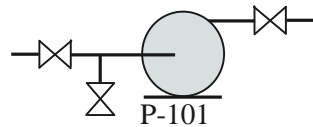
Rev B02



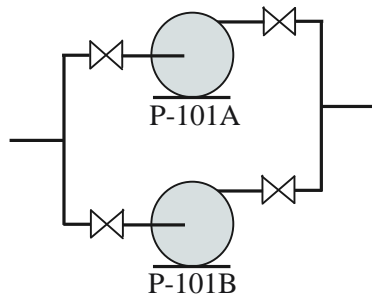
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Worked Example

- Resolving differences



The 'as-built' record with the **maintenance** change



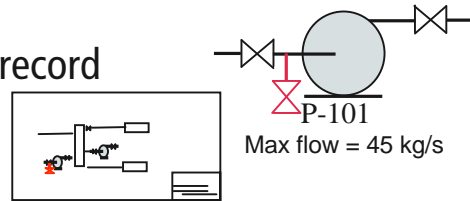
Local **engineering** plans to install bypass

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Management of change

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The 'as-built' record



PlantA (=design basis)

Rev C

- Email / SPF notification of as-built change
 - Due to claim – warning of parallel working
 - Due to merge – design basis change
- Object status

Project1

List of Notifications

Name	Description	Creation Date
Claimed: P101 (DEVTag) Into PlantA.MaintenanceProject	The 'DEVTag' object called 'P101' was claimed from 'PL PlantA' into 'PlantA.Maintenanc...	13/05/2008 18:12:

Find Tags (DEV) = ""

Name	Description	Type	Category	Weight	Height	Width	Length	Config	Conflicts Resolved	N...	Class
M101	pump motor	Process-equip...	Process equipm...	700 kg	0.4 m	0.4 m	0.75 m	PR_Project1	True	0	DEVTag
M101-A	pump motor	Process-equip...	Process equipm...	700 kg	0.4 m	0.4 m	0.75 m	PR_Project1	True	0	DEVTag
P101	pump	Material transf...	Process equipm...	450 kg	0.5 m	0.4 m	0.7 m	PR_Project1	False	0	DEVTag
P101-A	pump	Material transf...	Process equipm...	450 kg	0.5 m	0.4 m	0.7 m	PR_Project1	True	0	DEVTag
PA100	pump	Material transf...	Process equipm...	450 kg	0.5 m	0.4 m	0.7 m	PR_Project1	False	0	DEVTag

Concurrent Engineering

- Compare Object to Higher Configuration...
- Resolve Conflicts...
- Copy...

Tag Name	Value	Status
IDEVTagFlowEquip	45 kg/s	Value altered in the current config
DEVMaxFlowRate	30 kg/s	
	45 kg/s	

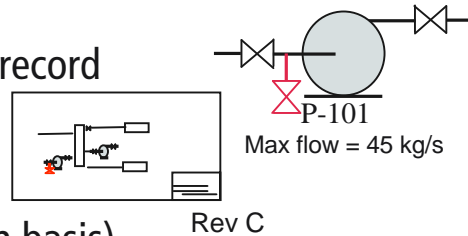
Cancel

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Management of change - documents

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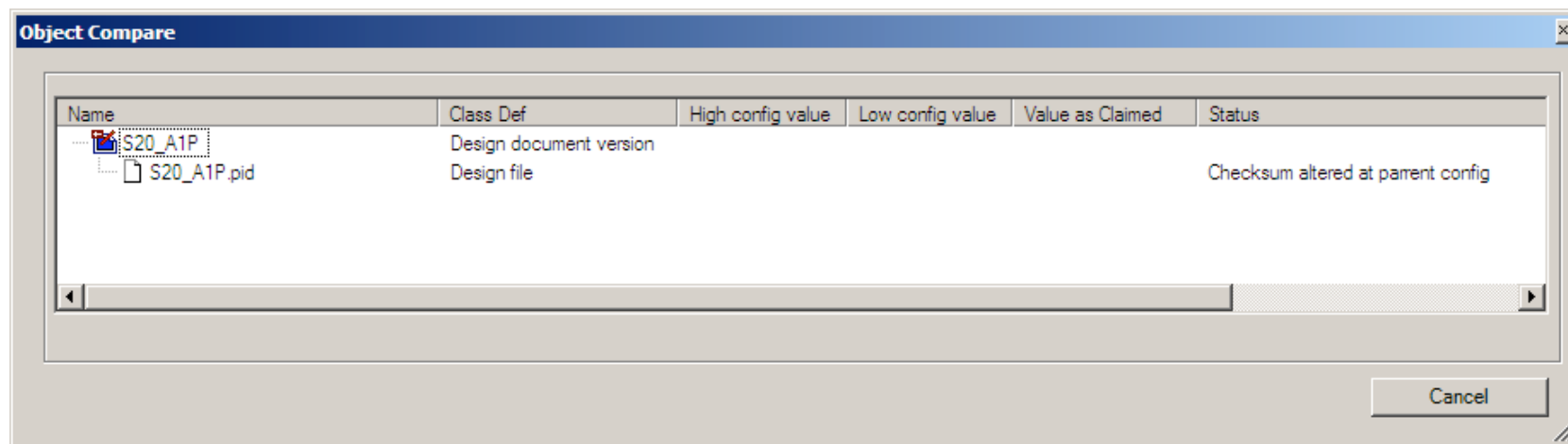
The 'as-built' record



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



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