Advanced Product Quality Planning (AQ9)

BPA Delivery 7 for V5R19 (V5.7)

User's Guide

Modification Tracking

Version	Date	Done by	Modification
D7W35.3	26 Aug 2009	IJK	Modification Tracking Table added

Table of content

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Introduction

In order to provide an integrated environment to manage FMEA and Control Plan for engineering department, a solution based on SMARTEAM WEB EDITOR i.e.APQP, is provided to all engineers. This tool should enable users to manage information in database and to share with others.

APQP objectives are:

Support the collaborative management of FMEA, Control Plan, and Gage R&R across world wide product development teams.

- Support easy edit tool to make Design FMEA and Process FMEA.
- Generate summary screen.
- Generate Gage report and Control Plan report.

The purpose of this document is to help the reader understand how to use the APQP solution.

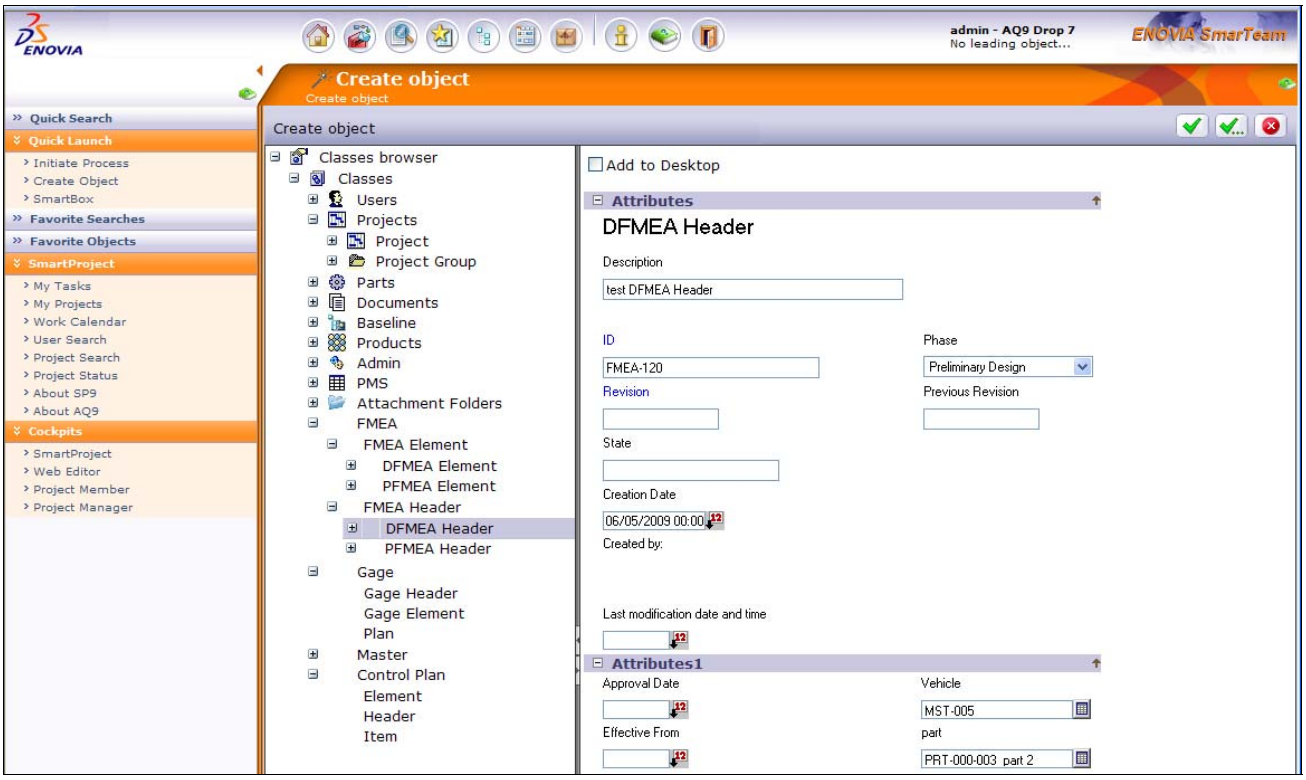
1 Overview of APQP

This chapter describes and explains all the functionalities related to APQP

1.1 APQP General Features and Configuration

- ***System Look and Feel***

APQP's default look & feel is different from SmarTeam Web Editor's look & feel.



1.2 How to Create a New Project

1.2.1 FMEA Definition

1. **From Scratch:**
   a. Create a new project object

b. Directly with Web Editor: By using SmarTeam Web Editor standard operation, user can add FMEA Head objects

2. By Reusing an Existing Project:

c. Directly with Web Editor.

- Create a new Project object.
- Use FMEA Copy tool from the project profile card. From this interface, you can browse the existing projects and select the project you want to copy from.
- You can copy Design FMEA as well as Process FMEA.If user click on header check box, the FMEA header will get copied. If user clicks on FMEA element check box header will get automatically selected and header along with elements will be copied.

1.2.2 Control Plan Definition

1. From Scratch:

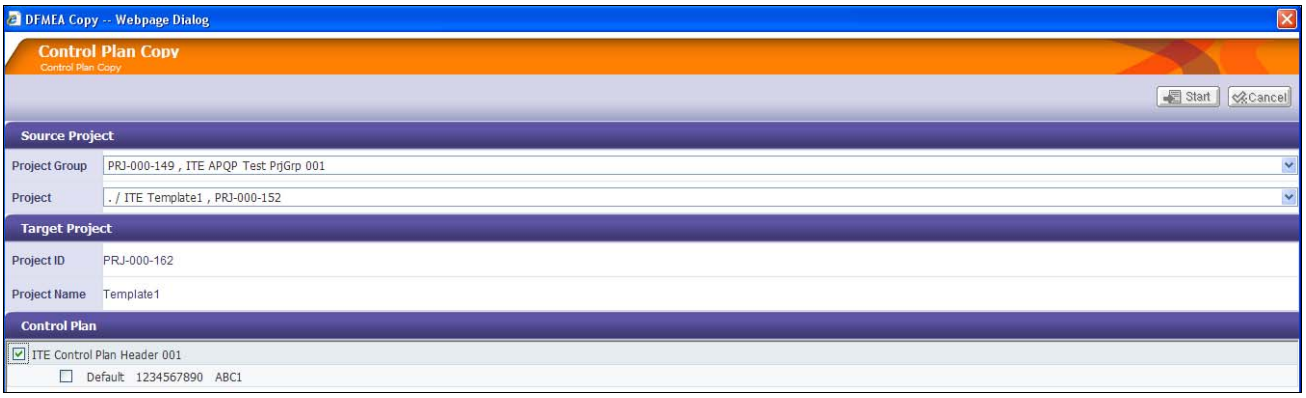
a. Create a new Project object.

b. Directly with Web Editor: By using SmarTeam Web Editor standard operation, user can add Control Plan Header, Element, and Item objects.

2. By Reusing an Existing Project:

a. Directly with Web Editor.

- Create a new Project object.
- Use Control Plan Copy tool from the project profile card. From this interface, you can browse the existing projects and select the project you want to copy from.
- Choose Header, Element, or Item object. If user click Item, system choose upper Header and Element by default. When user unselect Header, sub Elements and Items are unselected.



1.3 Project Execution

1.3.1 FMEA

1. Edit

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a. From Design FMEA or Process FMEA Head, user can call edit and then Update

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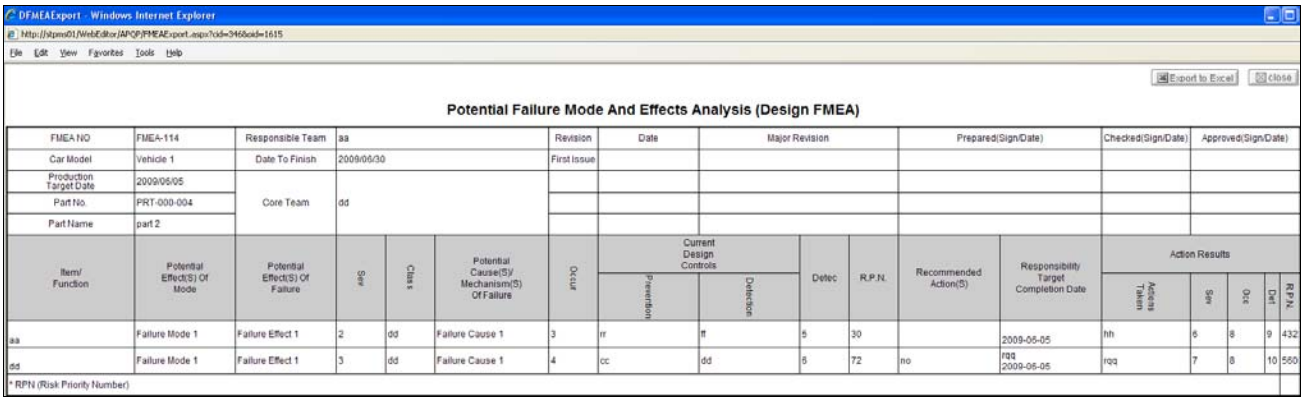
2. Export

a. By clicking Export to excel, user can save to Microsoft excel.



DFMEAExport - Windows Internet Explorer

Export to Excel | Close

Potential Failure Mode And Effects Analysis (Design FMEA)

FMEA NO	FMEA-114	Responsible Team	aa	Revision	Date	Major Revision	Prepared(Sign/Date)	Checked(Sign/Date)	Approved(Sign/Date)
Car Model	Vehicle 1	Date To Finish	2009/06/30	First Issue					
Production Target Date	2009/06/05	Core Team	dd						
Part No.	PRT-000-004								
Part Name	part 2								

Item/ Function	Potential Effect(S) Of Mode	Potential Effect(S) Of Failure	Sev	Class	Potential Cause(S)/ Mechanism(S) Of Failure	Occur	Current Design Controls		Detec	R.P.N.	Recommended Action(S)	Responsibility/ Target Completion Date	Action Results				
							Prevention	Detection					Actions Taken	Sev	Occ	Det	R.P.N.
aa	Failure Mode 1	Failure Effect 1	2	dd	Failure Cause 1	3	rr	ff	5	30		2009-06-05	hh	6	8	9	432
dd	Failure Mode 1	Failure Effect 1	3	dd	Failure Cause 1	4	cc	dd	6	72	no	rqq 2009-06-05	rqq	7	8	10	560

* RPN (Risk Priority Number)

3. Chart

a. From Design FMEA Head or Process FMEA Head, user can call Chart View.

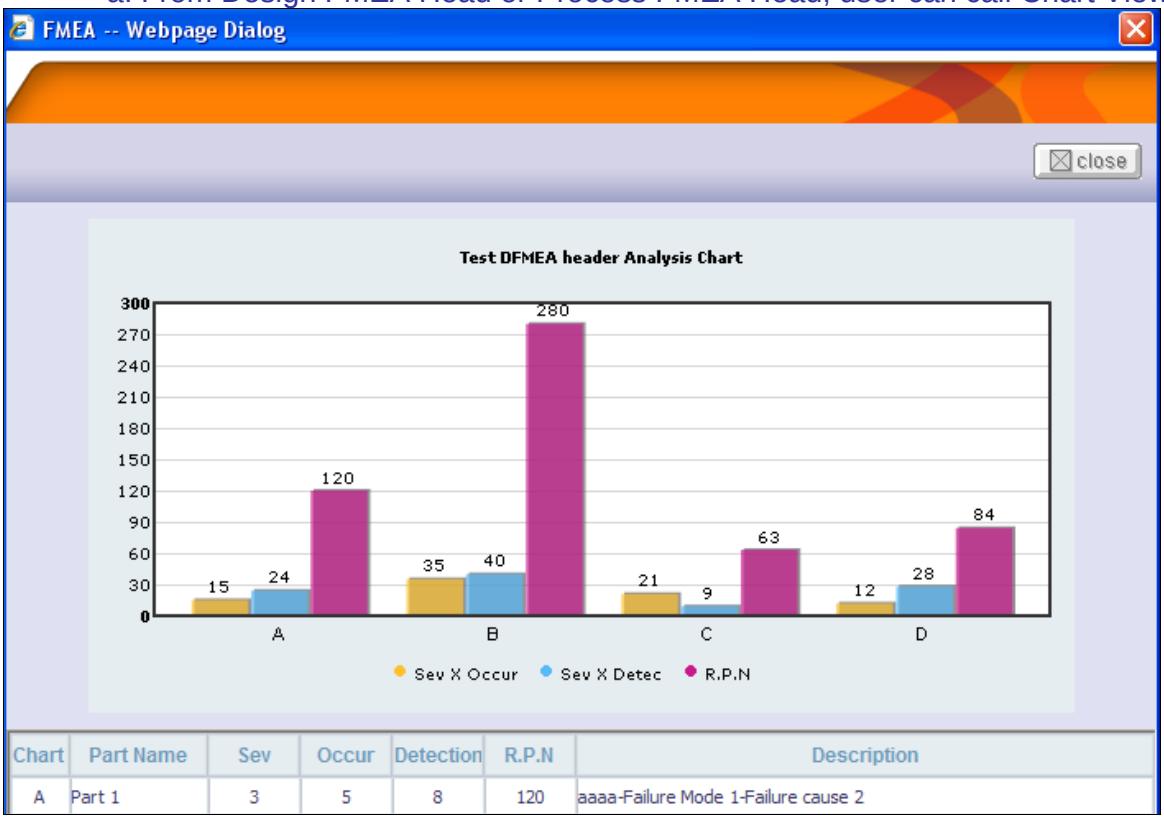


Chart	Part Name	Sev	Occur	Detection	R.P.N	Description
A	Part 1	3	5	8	120	aaaa-Failure Mode 1-Failure cause 2

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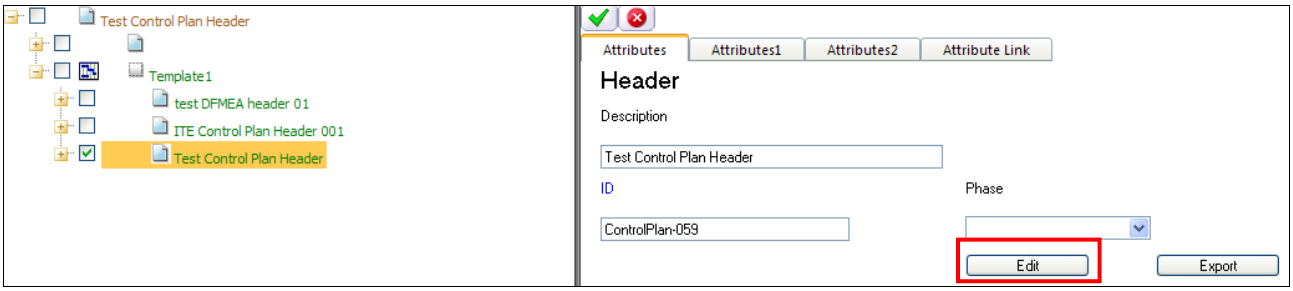
1.3.2 Control Plan

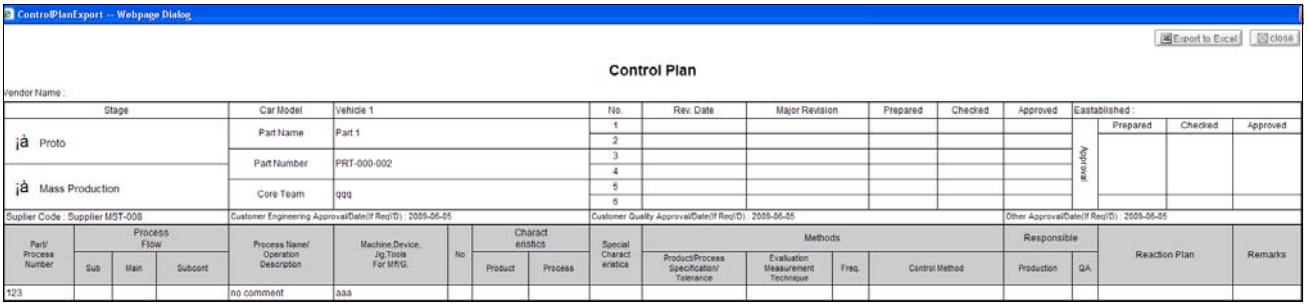
1. Edit

a. From Control Plan Header, user can call Update and then Edit.



2. Export

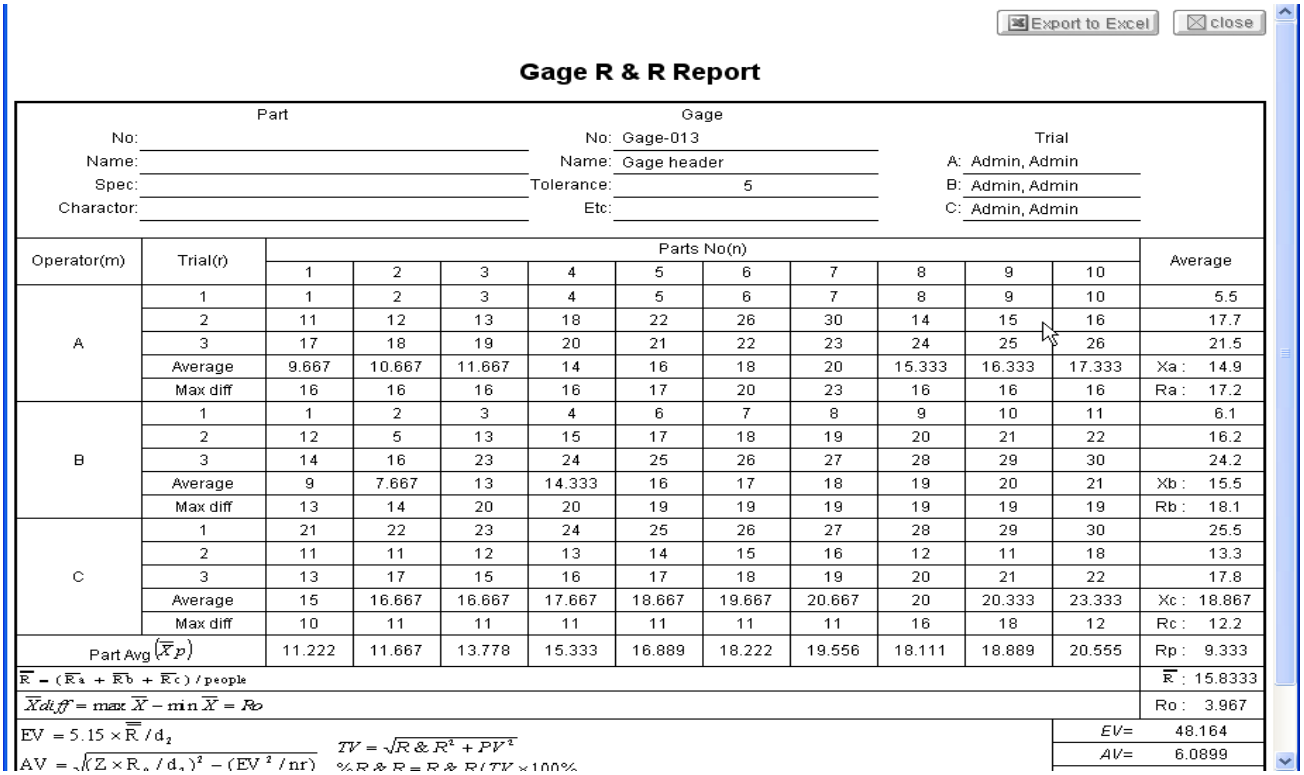
a. By clicking Export to Excel, user can save to Microsoft Excel.



1.3.3 Gage R&R Report

1. Edit.

a. From Gage Header, user can call Report View after calling Update.



Export to Excel close

Gage R & R Report

Part		Gage		Trial	
No:		No:	Gage-013	A:	Admin, Admin
Name:		Name:	Gage header	B:	Admin, Admin
Spec:		Tolerance:	5	C:	Admin, Admin
Charactor:		Etc:			

Operator(m)	Trial(r)	Parts No(n)										Average	
		1	2	3	4	5	6	7	8	9	10		
A	1	1	2	3	4	5	6	7	8	9	10	5.5	
	2	11	12	13	18	22	26	30	14	15	16	17.7	
	3	17	18	19	20	21	22	23	24	25	26	21.5	
	Average	9.667	10.667	11.667	14	16	18	20	15.333	16.333	17.333	Xa :	14.9
	Max diff	16	16	16	16	17	20	23	16	16	16	Ra :	17.2
B	1	1	2	3	4	6	7	8	9	10	11	6.1	
	2	12	5	13	15	17	18	19	20	21	22	16.2	
	3	14	16	23	24	25	26	27	28	29	30	24.2	
	Average	9	7.667	13	14.333	16	17	18	19	20	21	Xb :	15.5
	Max diff	13	14	20	20	19	19	19	19	19	19	Rb :	18.1
C	1	21	22	23	24	25	26	27	28	29	30	25.5	
	2	11	11	12	13	14	15	16	12	11	18	13.3	
	3	13	17	15	16	17	18	19	20	21	22	17.8	
	Average	15	16.667	16.667	17.667	18.667	19.667	20.667	20	20.333	23.333	Xc :	18.867
	Max diff	10	11	11	11	11	11	11	16	18	12	Rc :	12.2
Part Avg $(\overline{X}p)$		11.222	11.667	13.778	15.333	16.889	18.222	19.556	18.111	18.889	20.555	Rp :	9.333
$\overline{R} = (\overline{R}a + \overline{R}b + \overline{R}c) / people$												$\overline{R}$:	15.8333
$\overline{X}diff = \max \overline{X} - \min \overline{X} = Ro$												Ro :	3.967
$EV = 5.15 \times \overline{\overline{R}} / d_2$												EV=	48.164
$AV = \sqrt{(Z \times R_o / d_2)^2 - (EV^2 / nr)}$												AV=	6.0899
$TV = \sqrt{R\&R^2 + PV^2}$													
$\%R\&R = R\&R / TV \times 100\%$													

2 Prerequisite Settings for New Project

This chapter explains all the prerequisite Admin Tasks to be performed, related to APQP before starting or creating any new Project.

Note: The below detailed settings are for the scenario that is described in the next chapter, which is just a small example to guide the user.

2.1 Library

2.1.1 Create Reference Objects

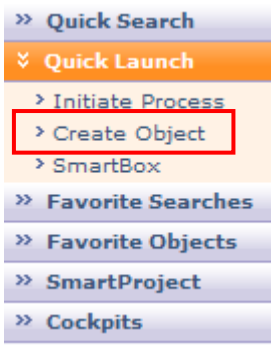
There are three groups library.

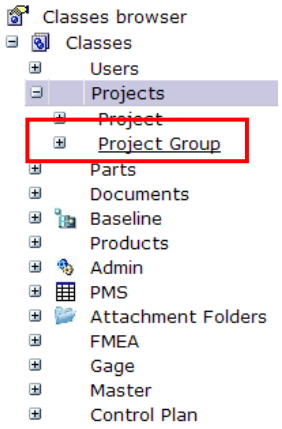
Failure Cause : List up all failure cause in this class and users can utilize.
Failure Effect : List up all effects from failure
Failure Mode : List up all failure was happened in the past.
Vehicle : List all OEM's vehicle code or name.
Supplier : List up all suppliers.

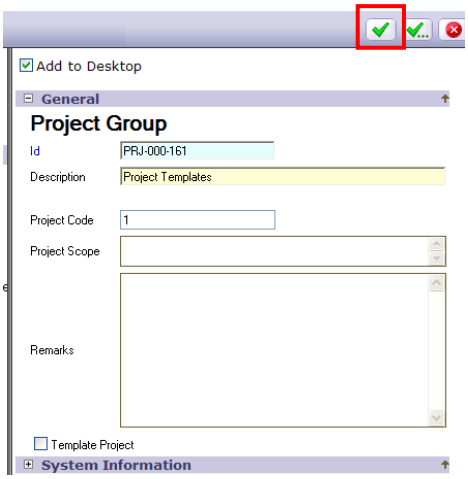
2.2 Project Template Creation

2.2.1 Project Group Creation

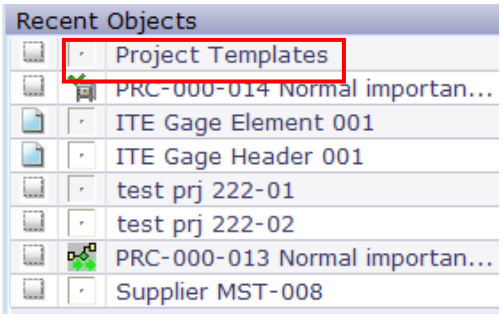
In SMARTEAM Web Editor, click on **Create Object**, select **Project Group** class from the Class Browser. Enter the description **Project Templates** and click on **OK** to Finish.

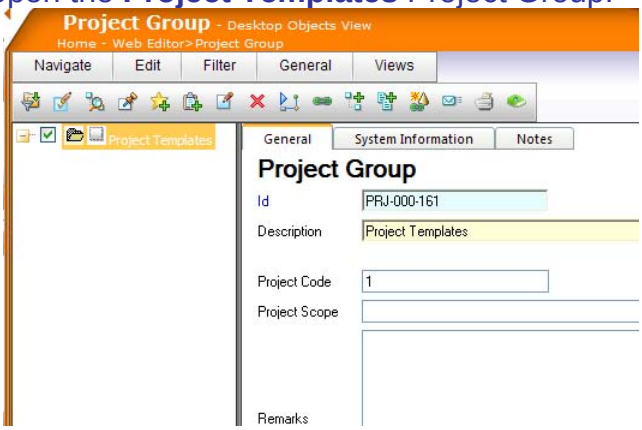




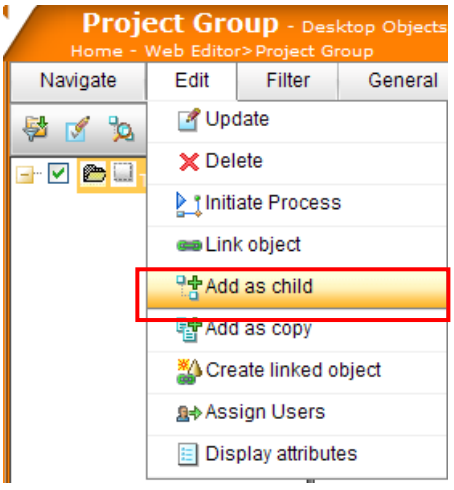


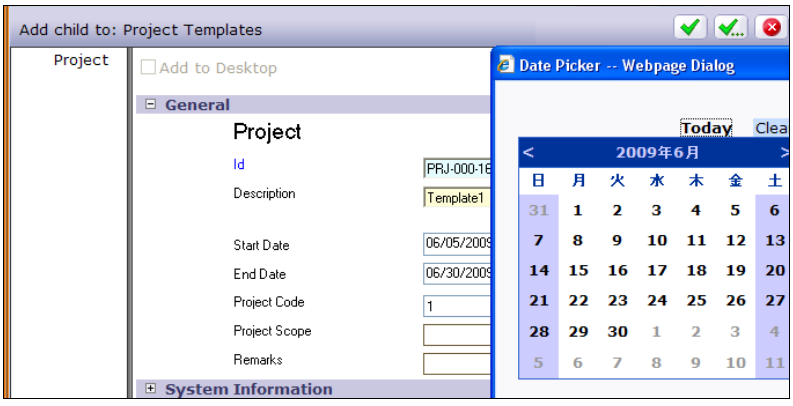
From the Recent Objects list, select and open the **Project Templates** Project Group.



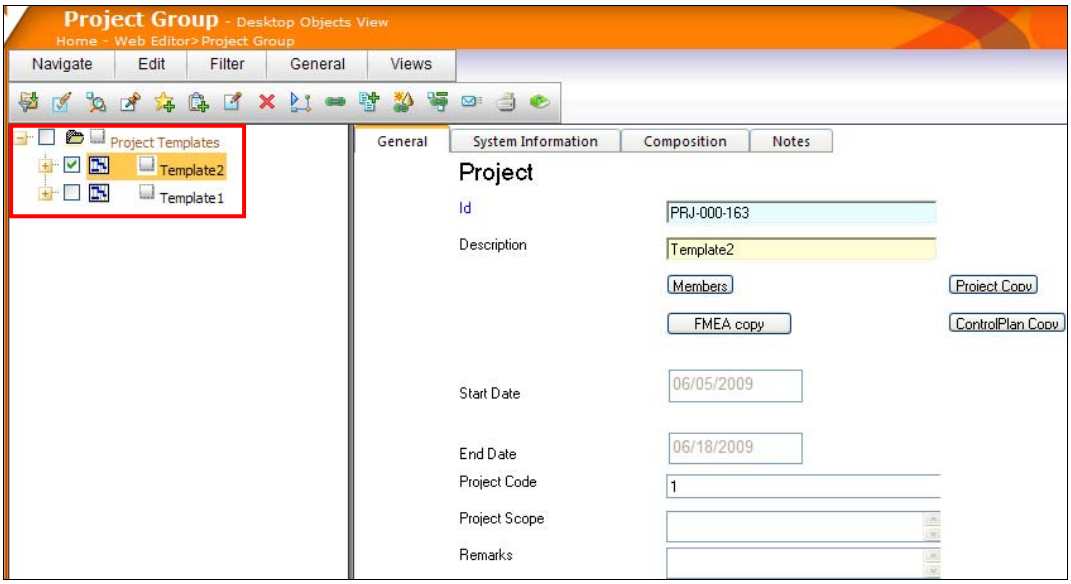


Perform **Add as Child** Action on it to create Project **Template1** under the **Project Templates** Group. Enter the **Description**, **Start Date** and **End Date** fields. Click on OK to finish.





Similarly also create **Template2** under the **Project Templates** Group. **Template1** and **Template2** are seen under the **Project Templates.**

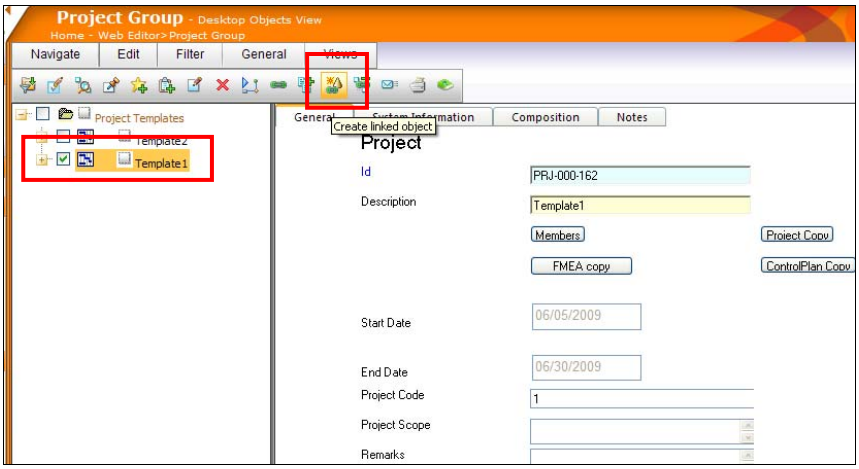


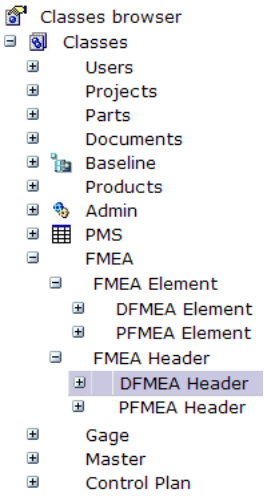
2.2.2 Template FMEA Definition

The user needs to define FMEA for both the projects **Template1** and **Template2**.

1. **for Template1:**

   Open the **Template1** and perform **Create Linked Objects** Action on it. Select **DFMEA Header** under the FMEA tree.

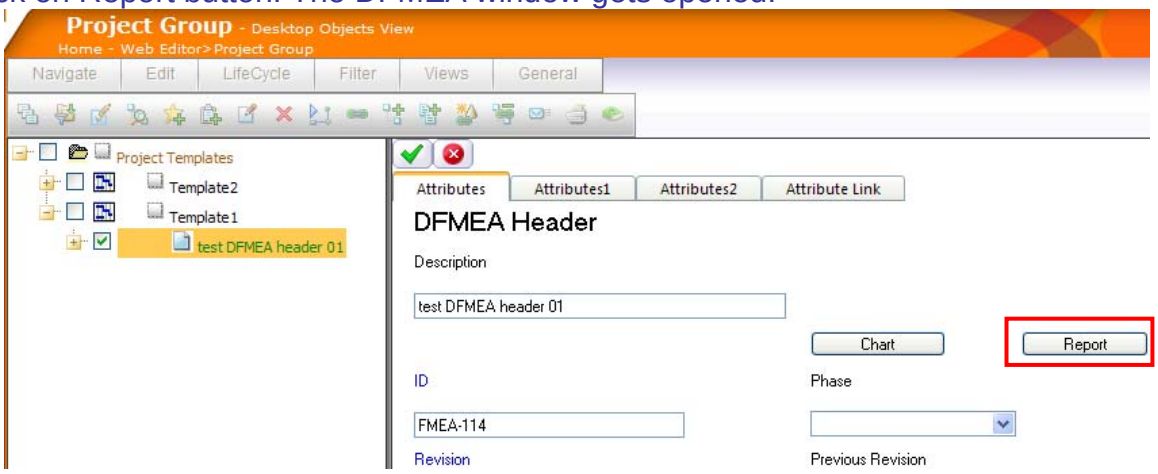




Enter the **Description** and the **Vehicle, Part, Manager, MP Date, Finish Date, Responsible Team, Core Team** fields and click **on** OK to finish**.**

Open the newly generated DFMEA Header. Perform **Update** Action on it

Click on Report button. The DFMEA window gets opened.



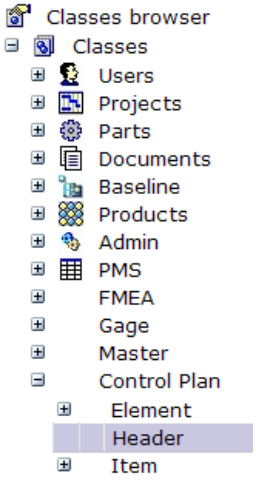
Click on “Add” button. Fill all the required information and click on save.

The element gets added. Number of such elements can be added.
Click on Update to update DFMEA Header. Close the page.

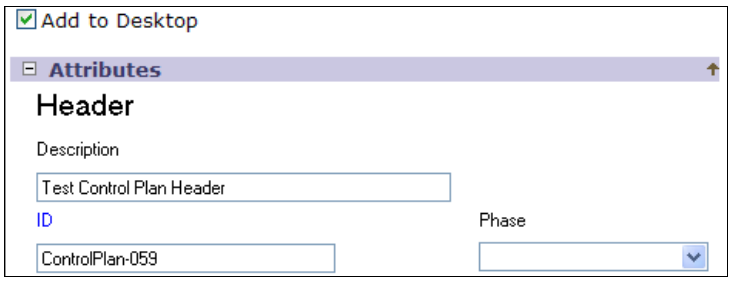
2.2.3 Template Control Plan Definition

1. Control Plan Structure for Template1:

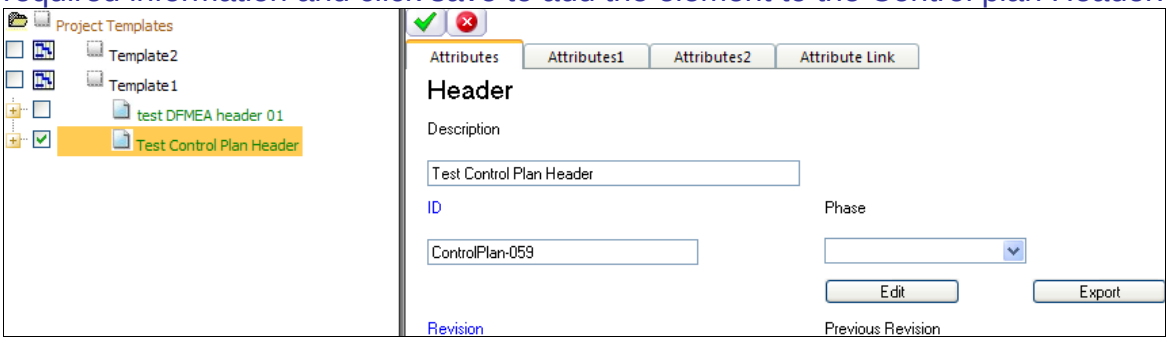
Select and open the **Template1** Project and perform **Create Linked Objects** Action on it, Select Header by expanding Control Plan tree.



Enter the **Description** and click on **OK.**



Open the **Control Plan Header** and perform **Update** Action on it, click **Edit .**Add all the required information and click save to add the element to the Control plan Header.



Click on **Update** to update the control plan to DB. Close the page.

3 End User Scenario on APQP

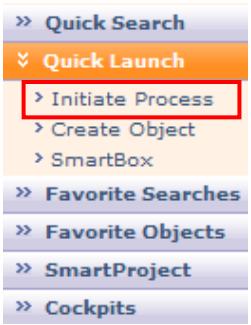
This chapter gives one small example of APQP application.

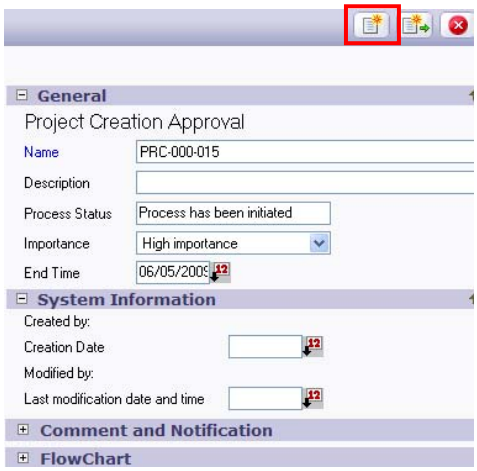
3.1 End User Operations

3.1.1 Phase 1: Project Creation

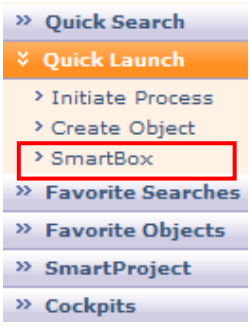
1. Launch SMARTEAM Web Editor.
2. Log in as **admin** and connect to the correct database.

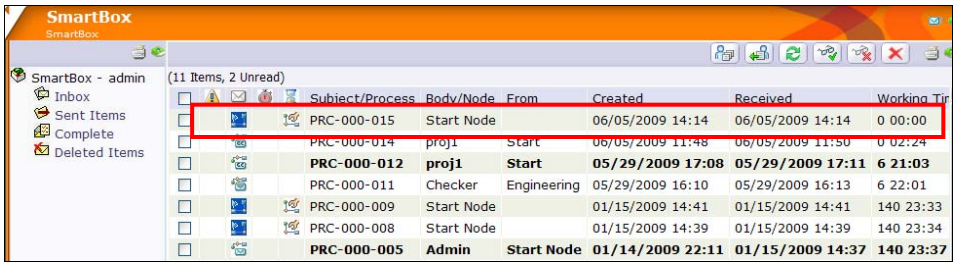
3. Click on **Initiate Process** from **Quick Launch** toolbar and start a **Project Creation Approval** process for the need that has been identified.
   - Fill the Importance field as High Importance.
   - Enter the End Time Date.
   - Click Create.



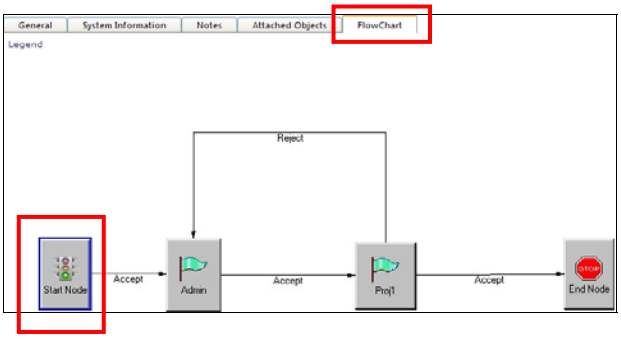


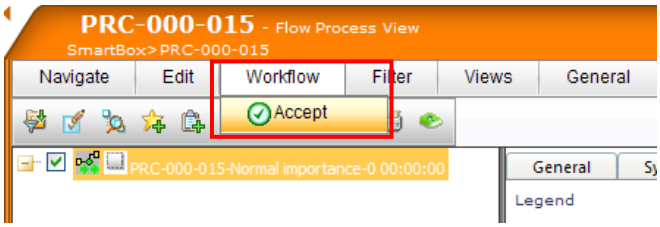
4. Click on **SmartBox** from **Quick Launch** toolbar and select the process in Inbox.



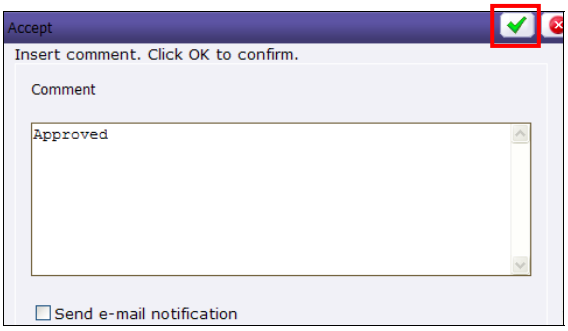


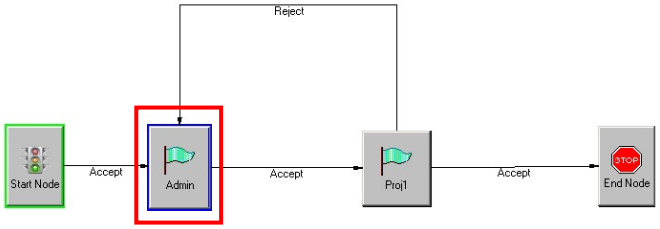
- Switch to Flow Chart tab and view it.
- Perform Accept Action on it.



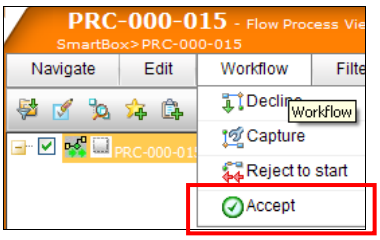


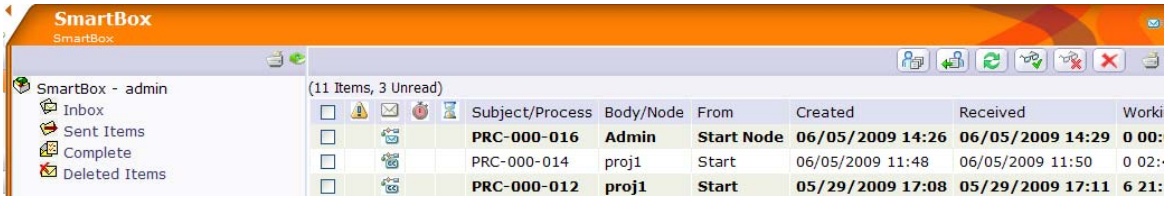
- Enter some comments and validate with ok.
- Again have a look on Flowchart, it is moved to second node for which user **admin** is only responsible.





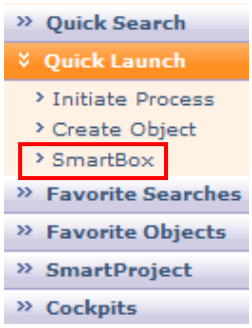
- Again perform Accept on it and validate with ok.
- Check the Inbox. No process will be displayed for admin user.

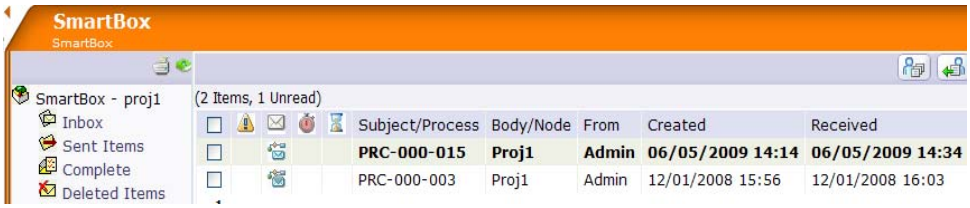




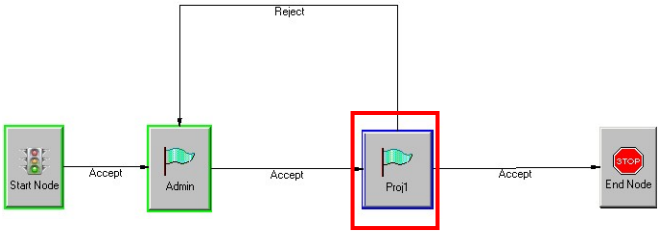
5. Click **Logout**.
6. Log in as **proj1** and connect to the correct database.

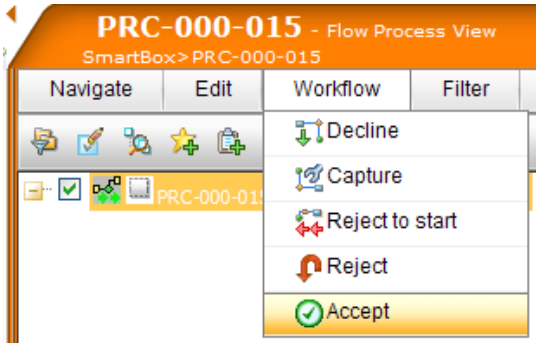
7. Click on **SmartBox** from **Quick Launch** toolbar and select the process in Inbox.





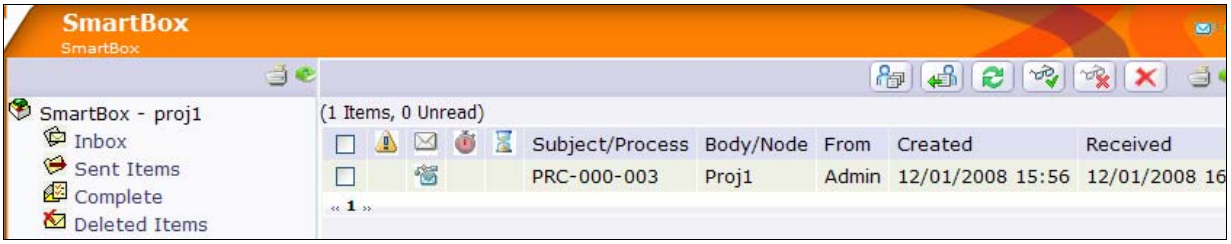
- Switch to Flow Chart tab and view it.
- Perform Accept Action on it.





- Enter some comments and validate with ok.

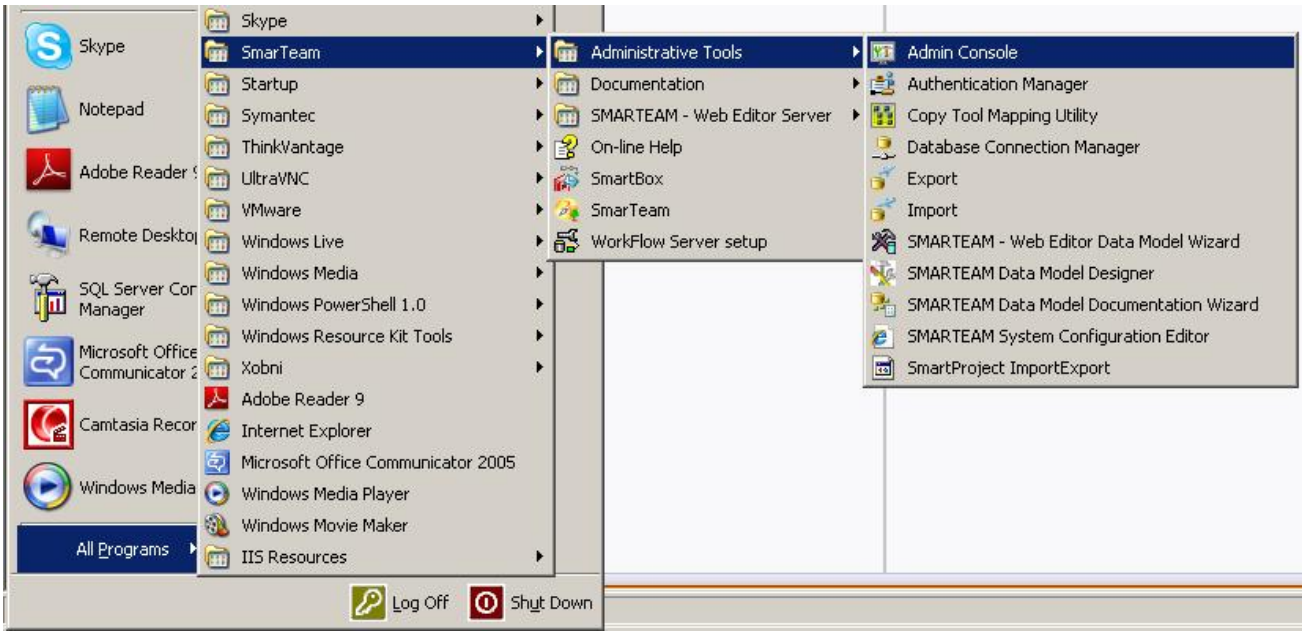
- Check the Inbox. The process “PRC-000-015” will not be displayed for proj1 user.

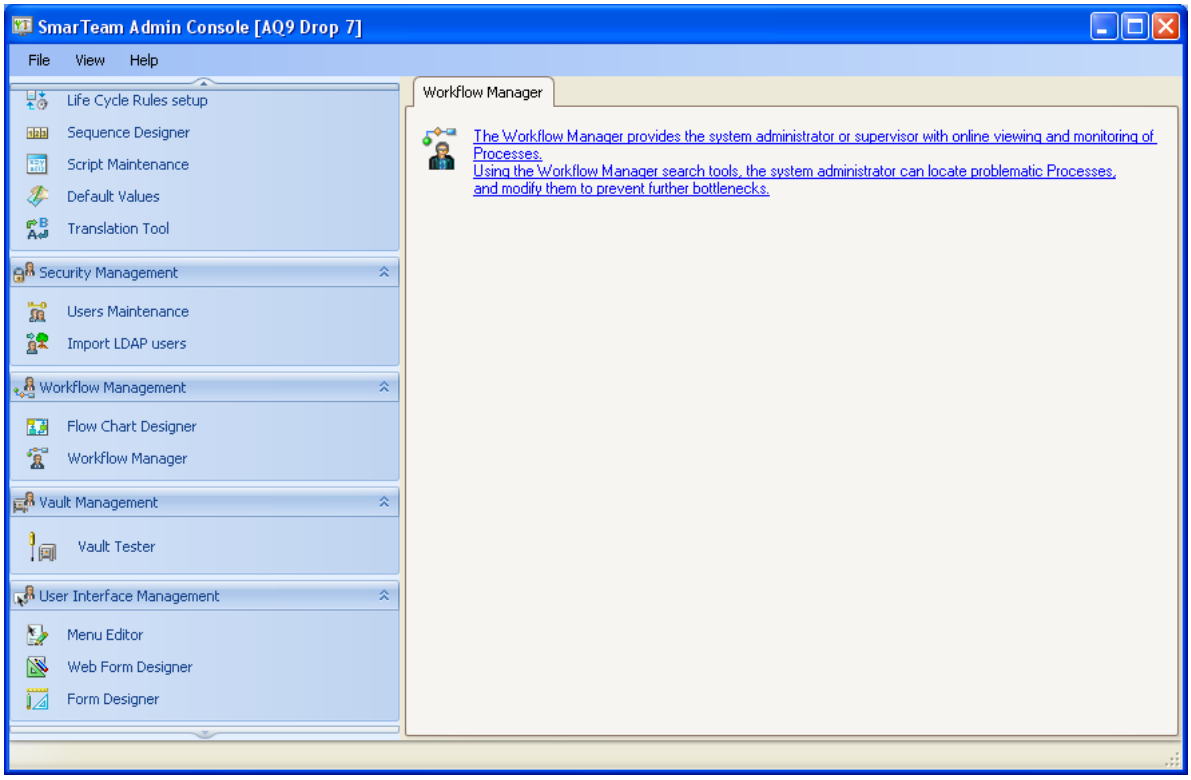


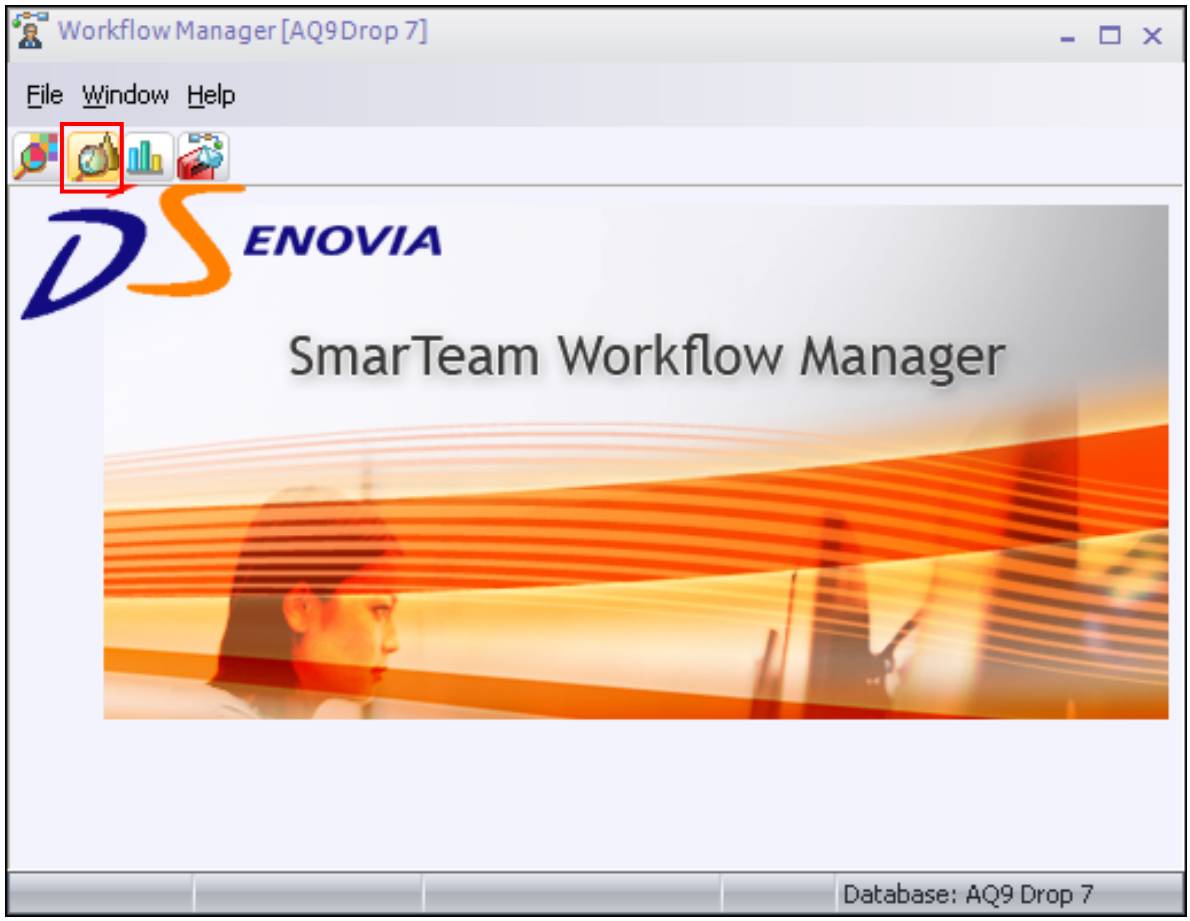
8. Click **Logout**.

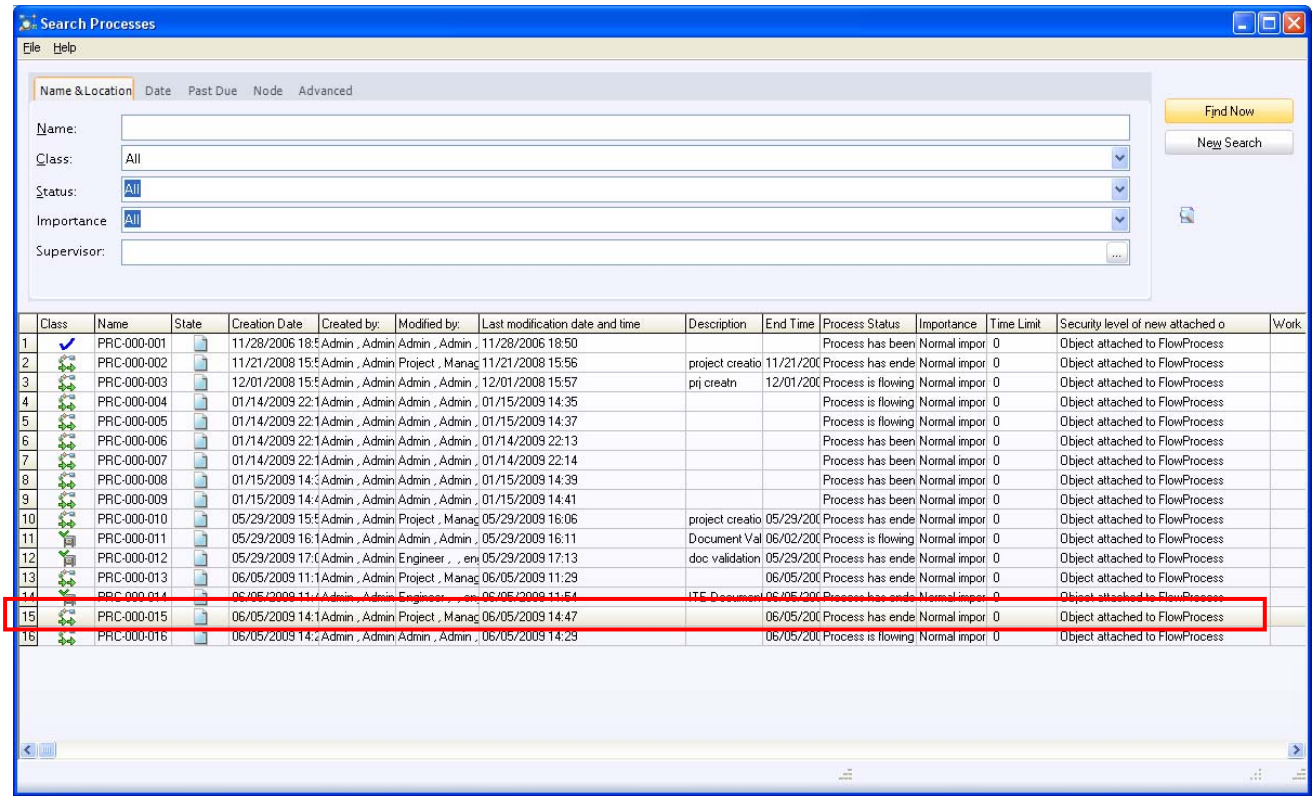
Process Progress Check from Administration Client

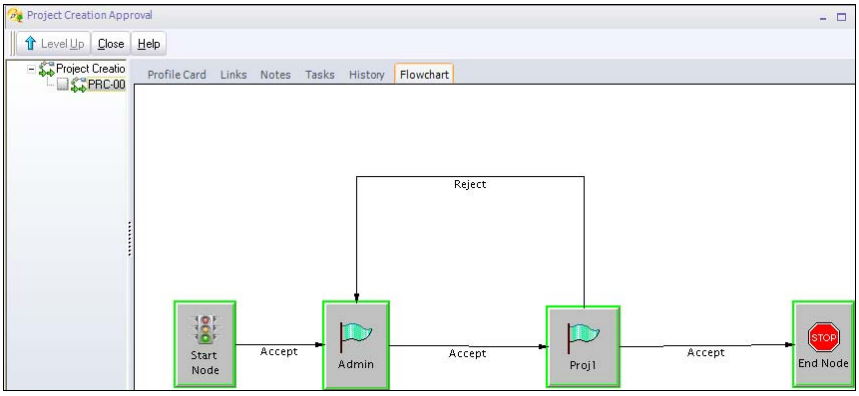
1. Launch **Workflow Manager** from the **SmarTeam Windows Admin Console** to view the progress of the process.
   - Search for Project Creation Approval process and view it.
   - All the nodes are displayed as completed.
   - Close the Workflow Manager.





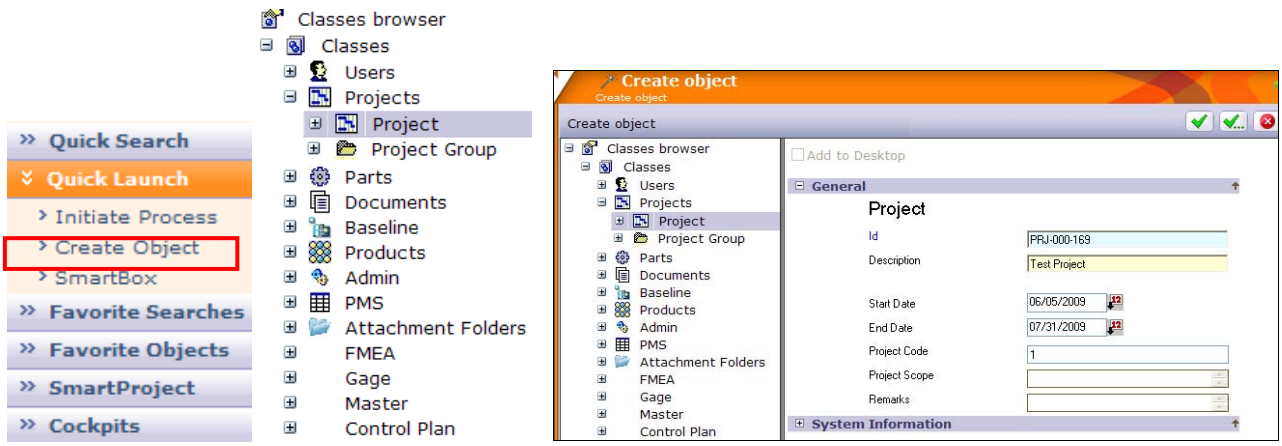






9. Log in as **admin** into SMARTEAM Web Editor and connect to correct database.

10. Click on **Create Object**; select **Project** class from the Class Browser.
    - Enter the Description Test Project, the Start Date and the End Date.



- Click on **OK button**.

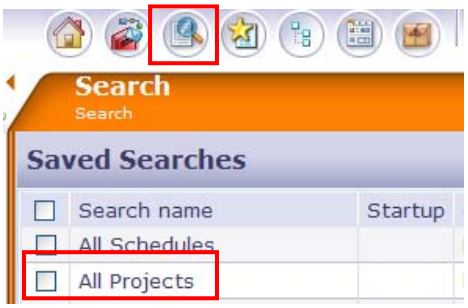
11. Click **Logout.**

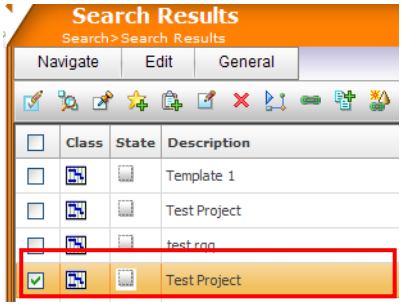
3.1.2 Phase 2: Project Definition

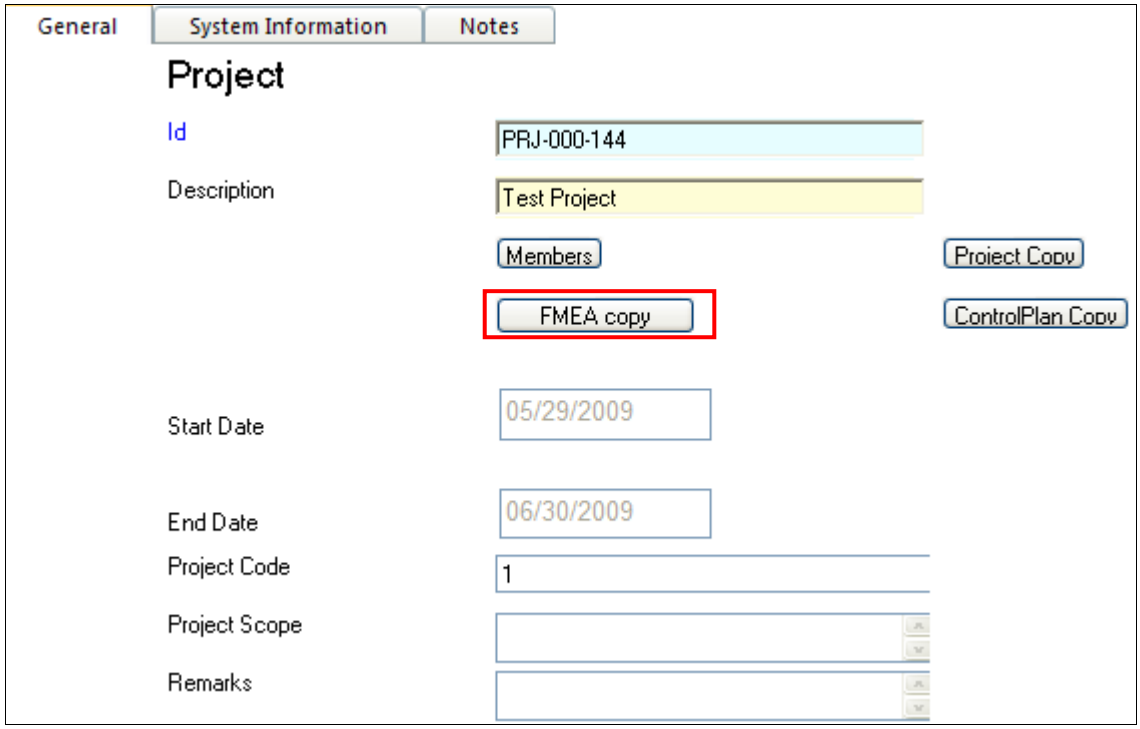
1. Log in as proj1 and connect to the correct database.

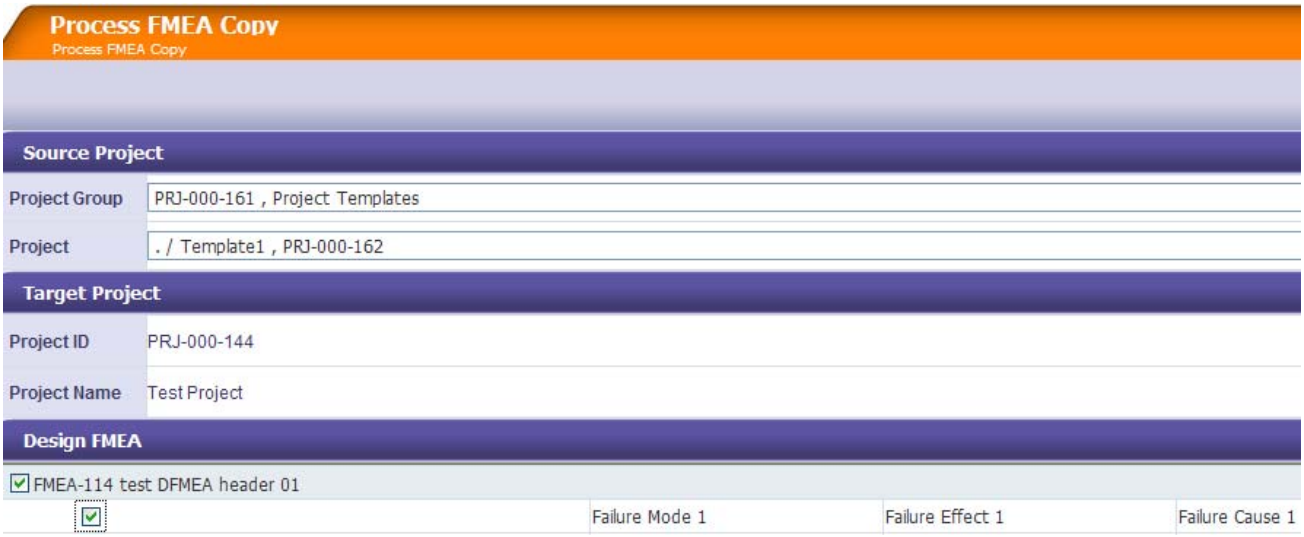
2. Click on icon “Search” and then find “All Projects”. Select the newly created project. Click FMEA Copy button on its profile card.

- Select “Project Templates” and “Template1” for the Source Project.
- Click Start and validate ok to the completion message.

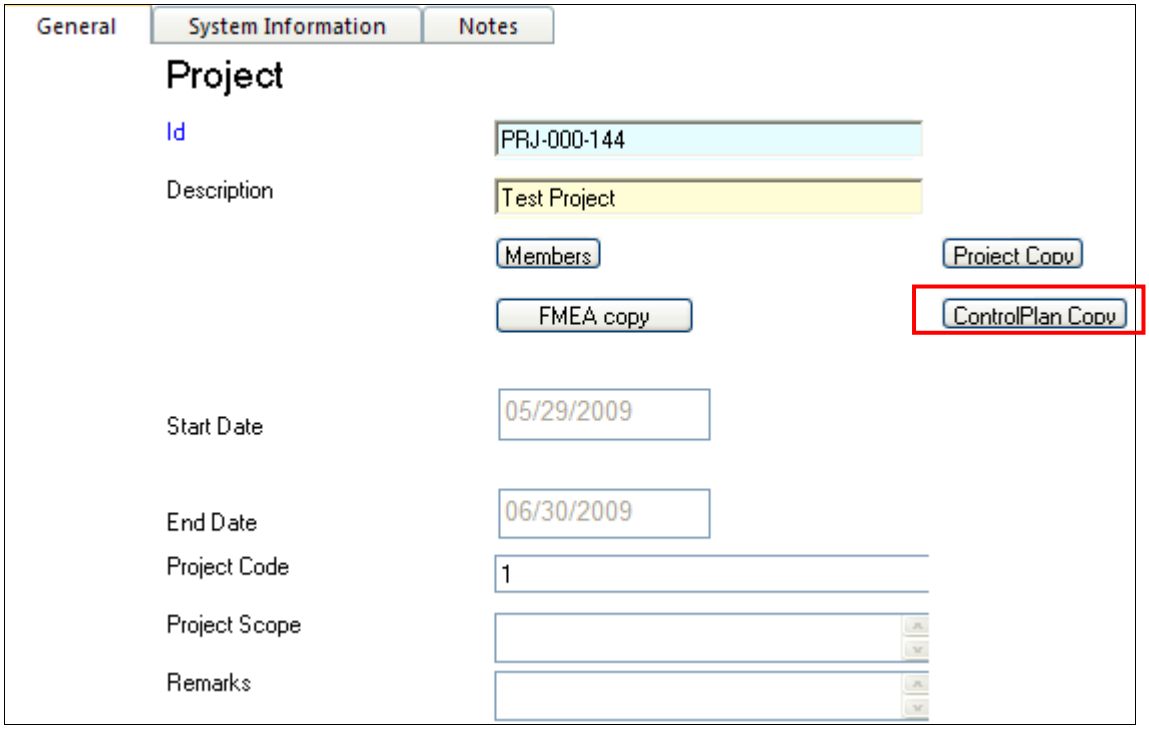


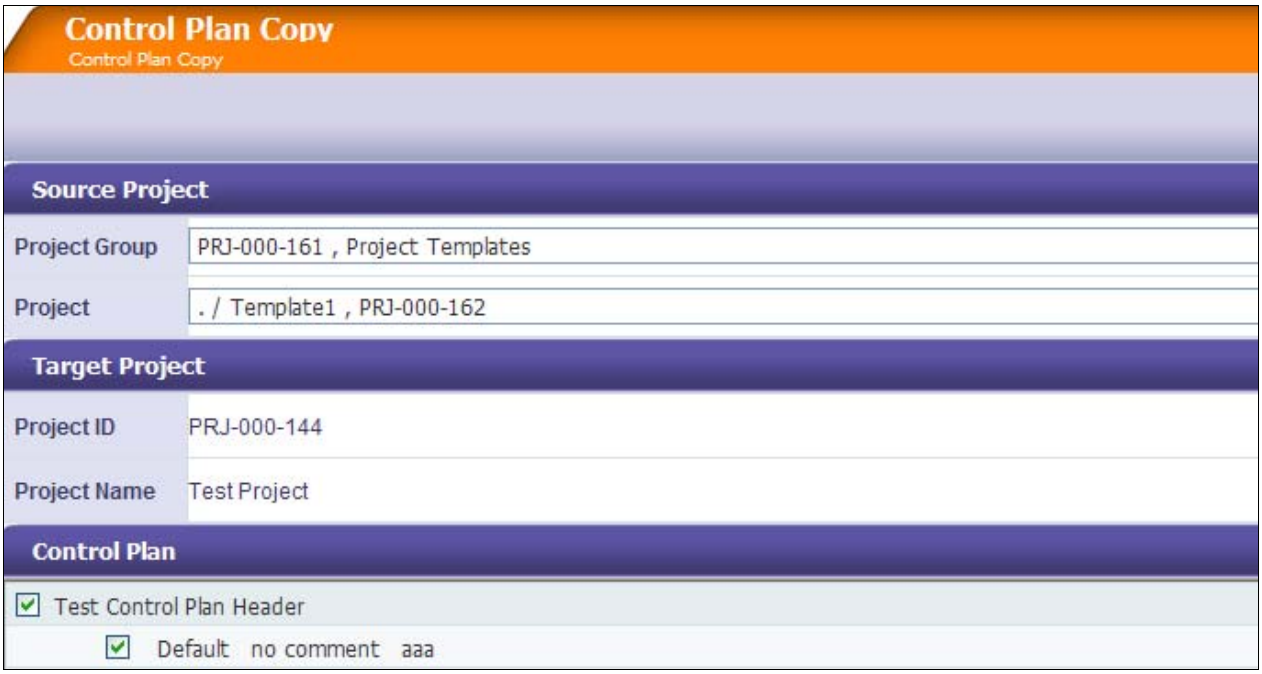




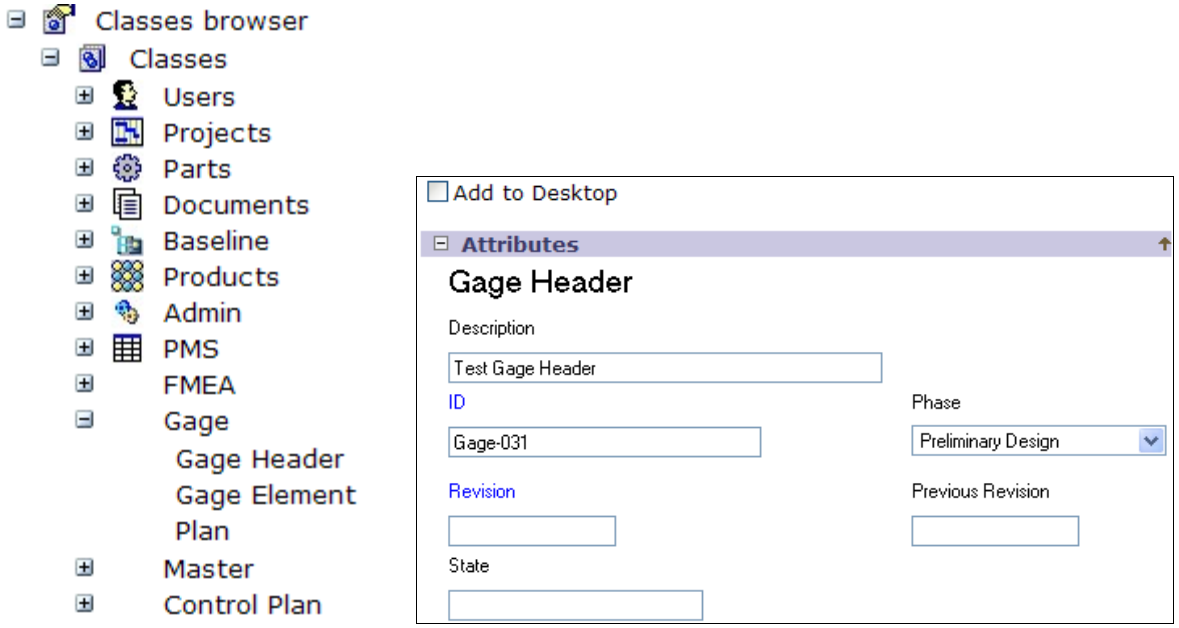


3. Click on Control Plan Copy under the Test Project.

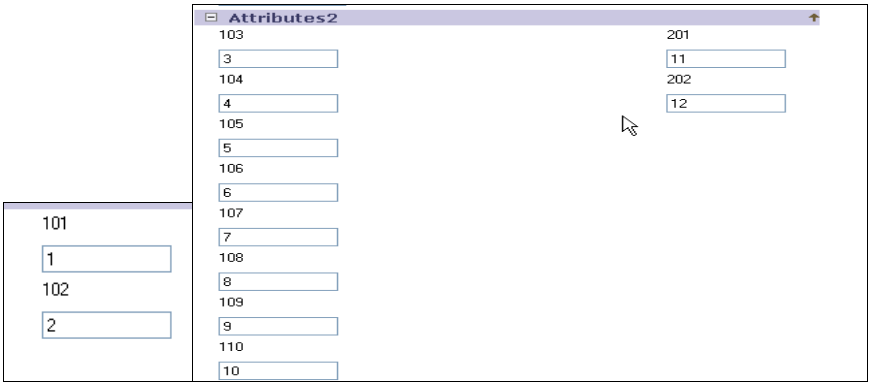


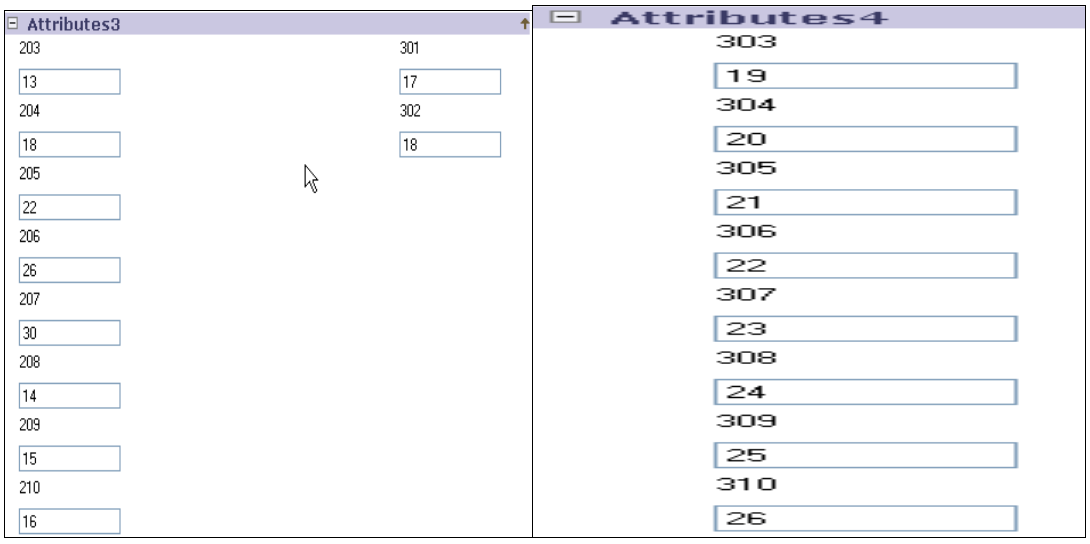


4. Logout from SmarTeam WED.
5. Login as “admin”
6. Click on icon “Search” and then find “All Projects”. Select “Test Project”.
7. Perform Create Linked Objects Action and select Header under the Gage tree. Enter the Description and others (Tolerance value is mandatory) and click Finish

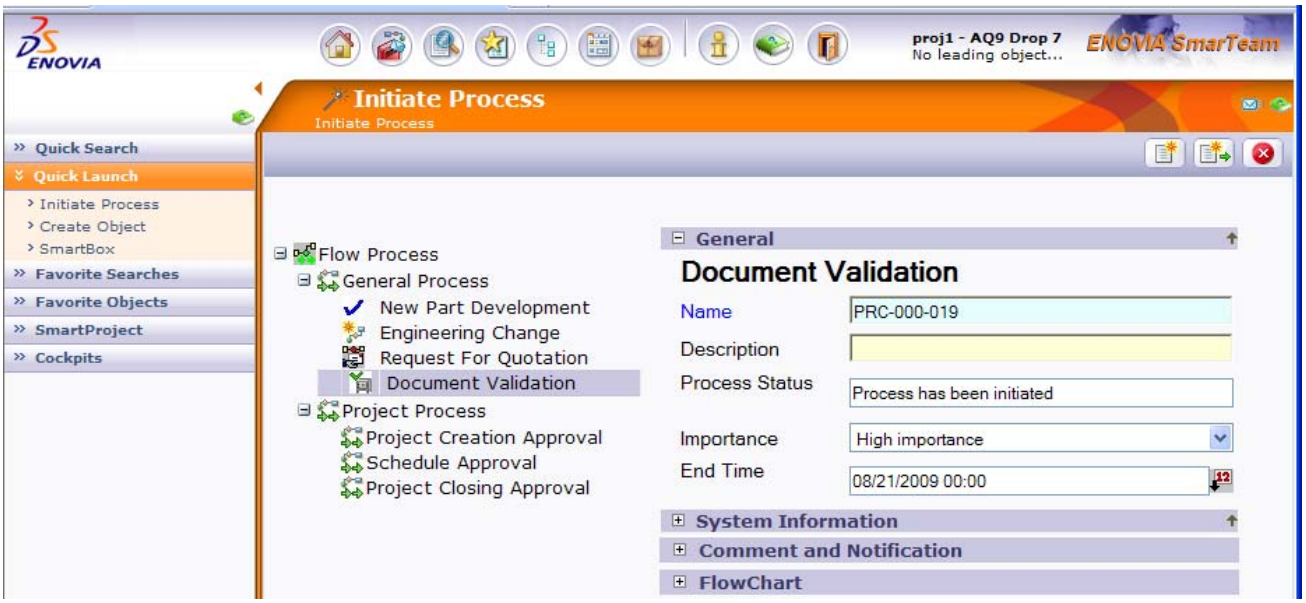


8. Open the Gage Header and perform Add as child Action, Select Gage Element from the class tree under Gage. Click Create and Finish after filling in Description & other information.

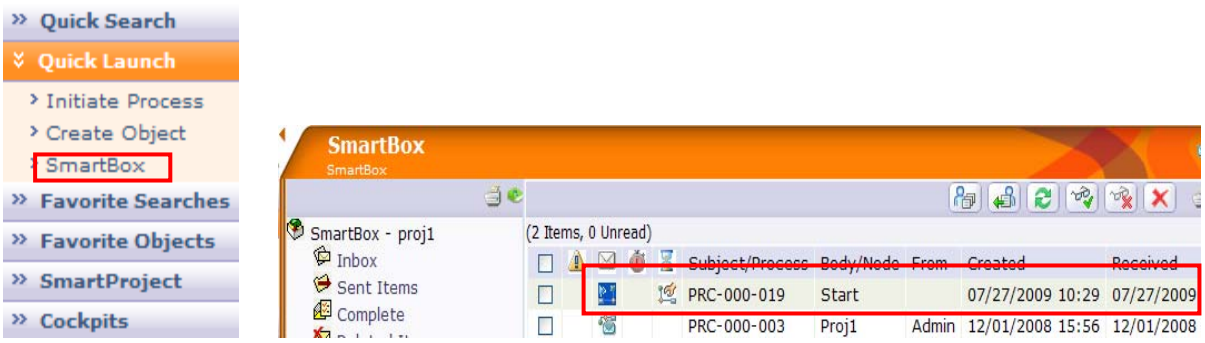




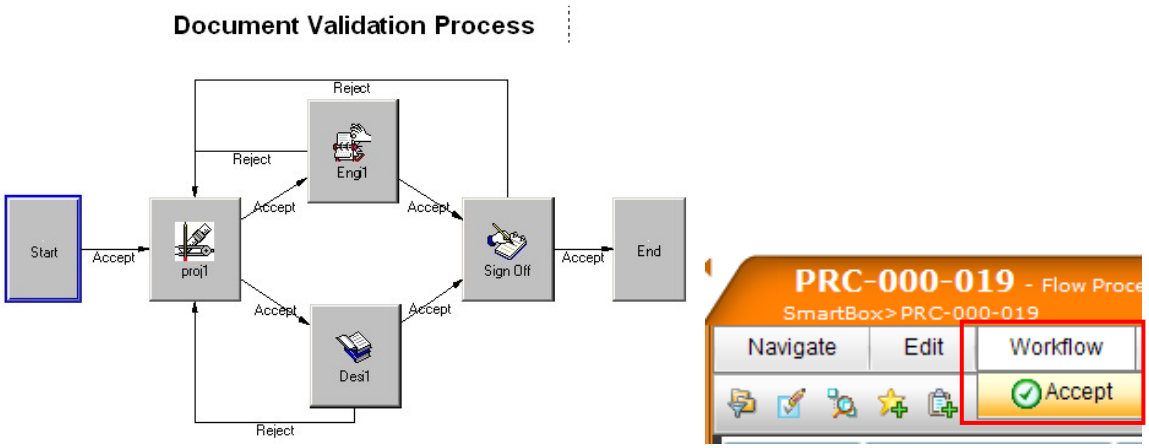
9. Logout from SmarTeam WED.
10. Login as “proj1”.
11. Click on Initiate Process from Quick Launch toolbar and start a Document Validation process to confirm the Project Definition from the assignees.
    - Fill the Importance field as High Importance.
    - Enter the End Time Date.
    - Click Finish.



12. Click on SmartBox from Quick Launch toolbar and select the process in Inbox.

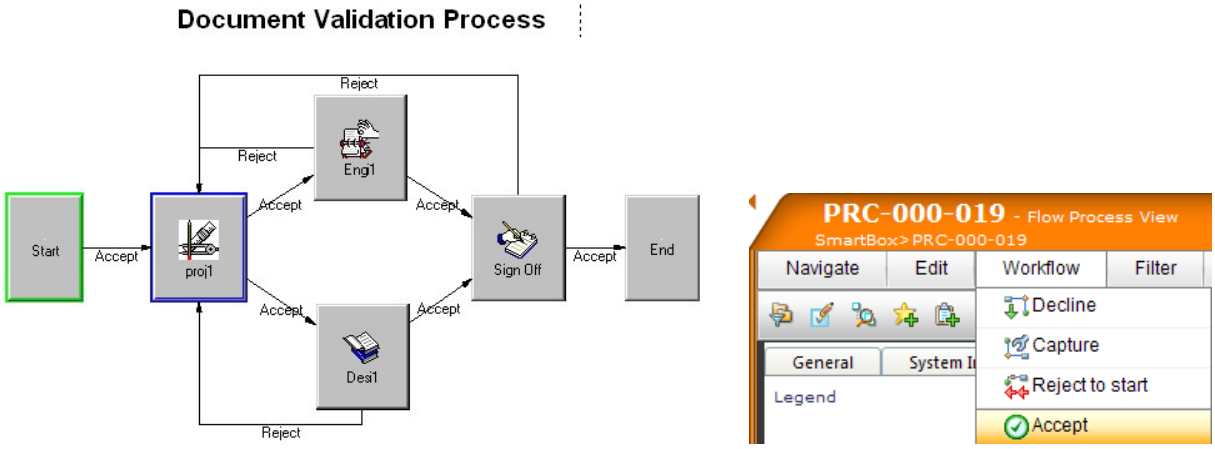


- Switch to Flow Chart tab and view it.
- Perform Accept Action on it.

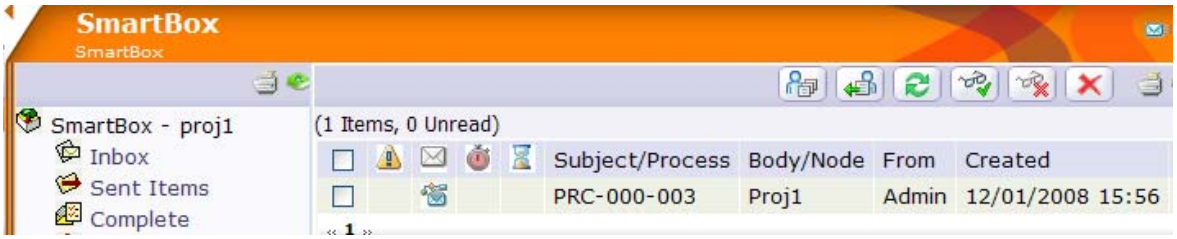


- Enter some comments and validate with ok.
- Check the Inbox and select the process in Inbox.

- Switch to Flow Chart tab and view it.
- Perform Accept Action on it.

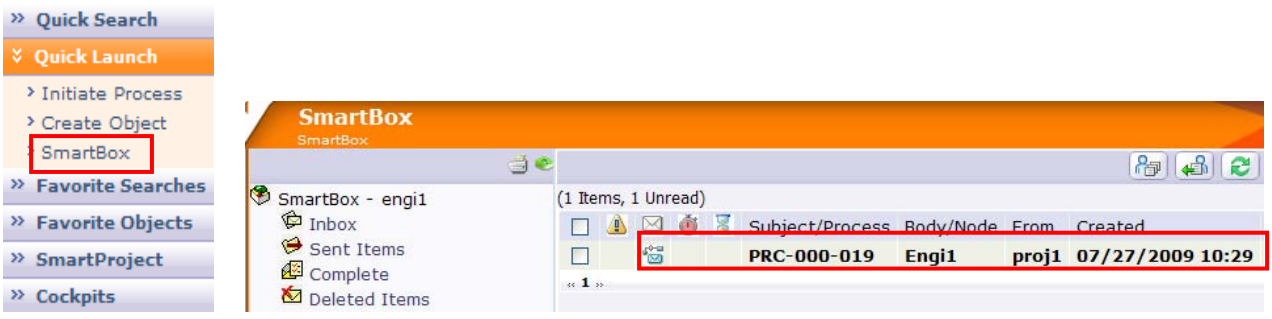


- Enter some comments and validate with ok.
- Check the Inbox. No process will be displayed for proj1 user.

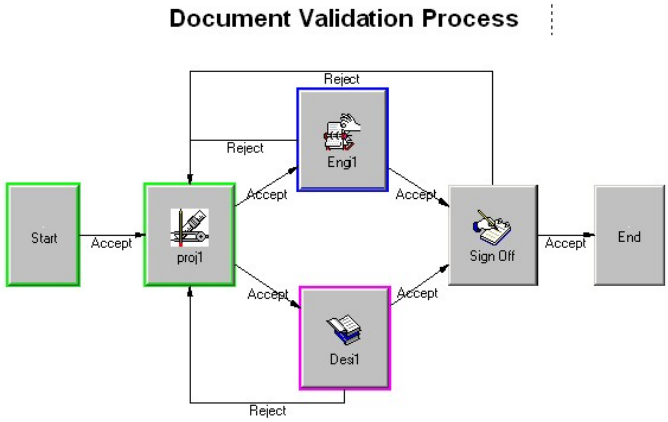


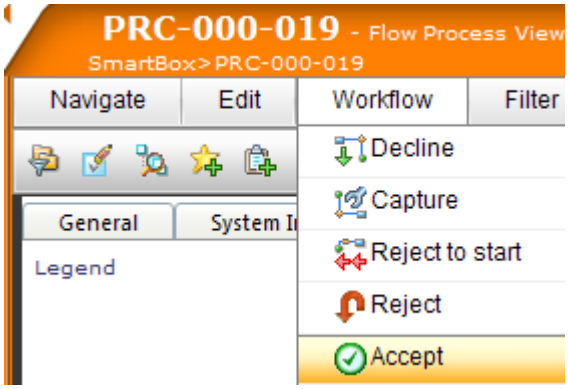
13. Click Logout.
14. Log in as engi1 and connect to the correct database.

15. Click on SmartBox from Quick Launch toolbar and select the process in Inbox



- Switch to Flow Chart tab and view it.
- Perform Accept Action on it.





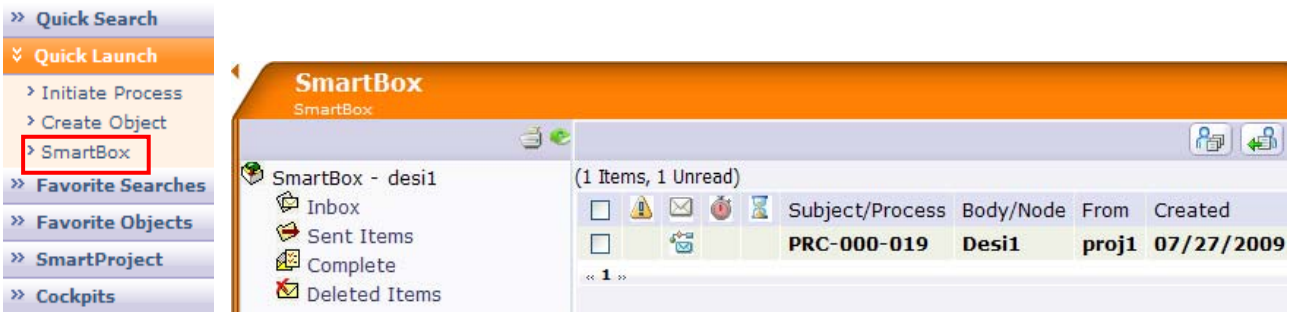
- Enter some comments and validate with ok.
- Check the Inbox. No process will be displayed for admin user.

16. Click Logout.

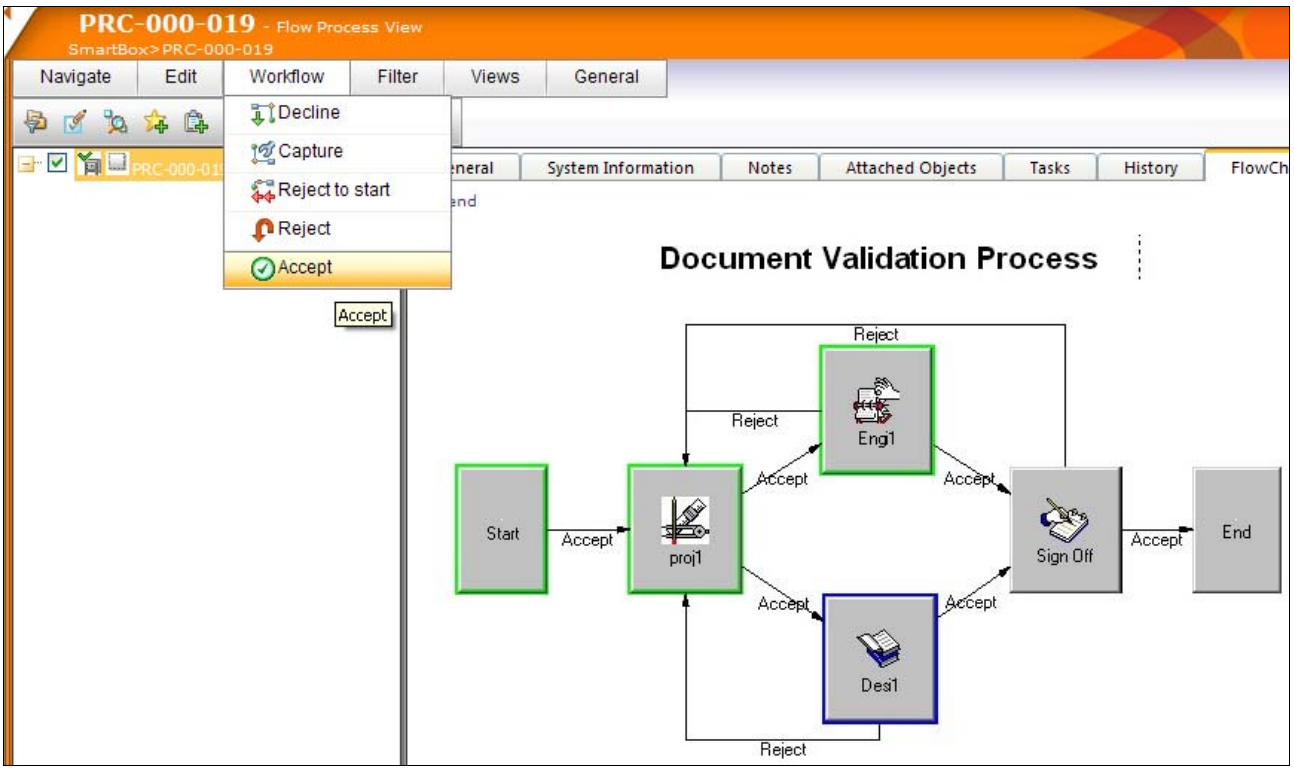
17. Log in as desi1 and connect to the correct database.

18. Click on SmartBox from Quick Launch toolbar and select the process in Inbox

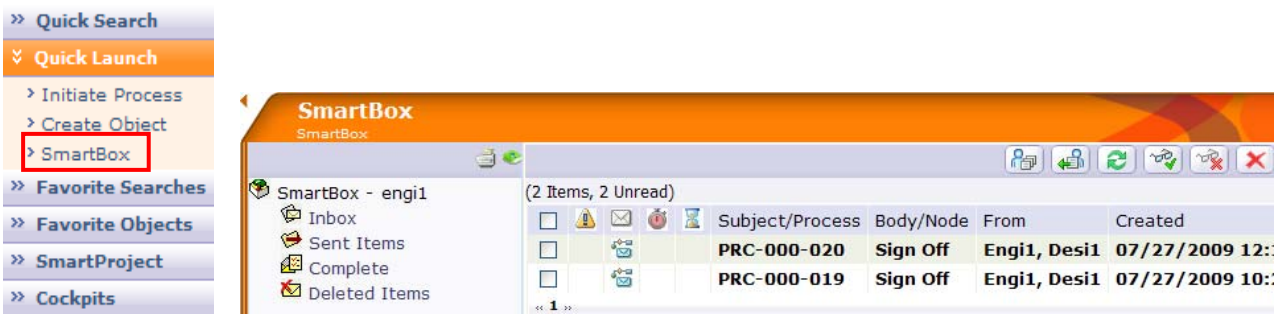
- Switch to Flow Chart tab and view it.



- Perform Accept Action on it.

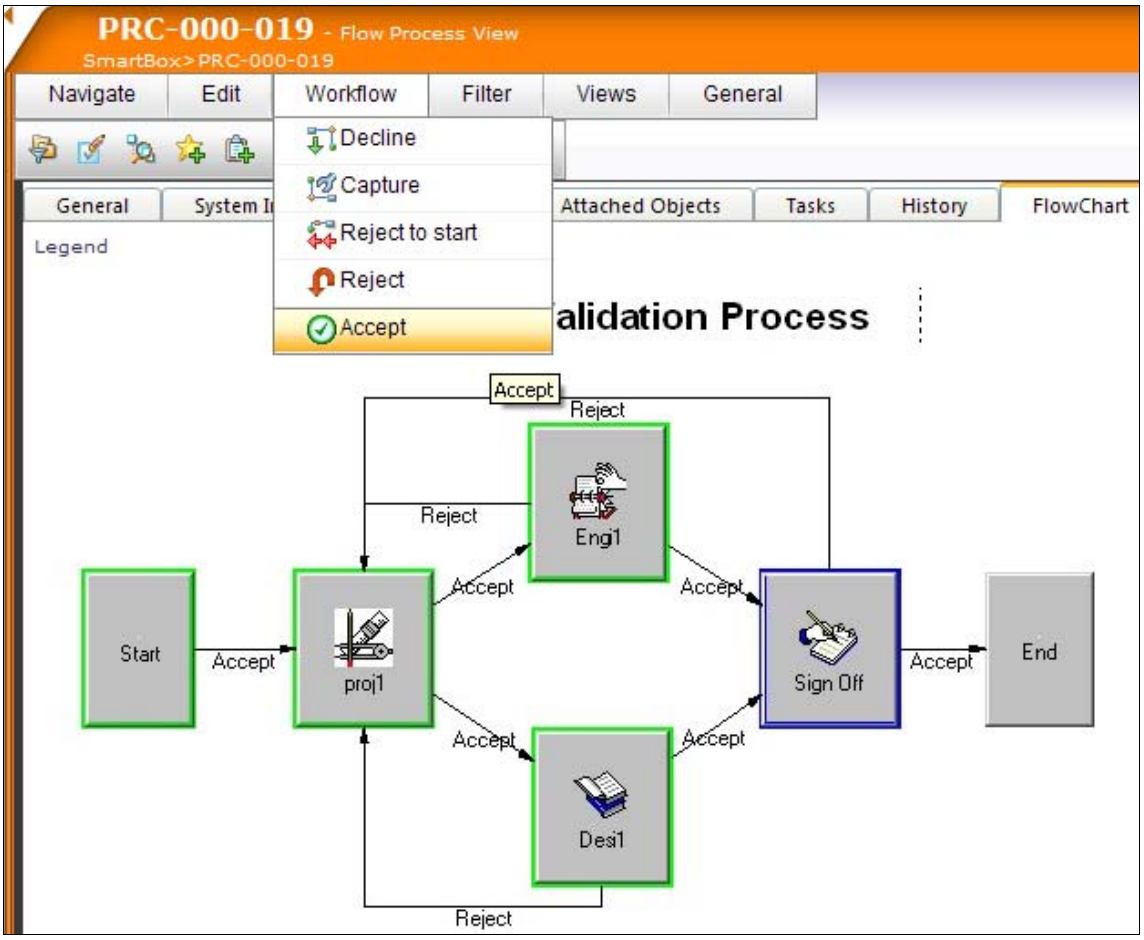


- Enter some comments and validate with ok.
- Check the Inbox and select the process in Inbox.



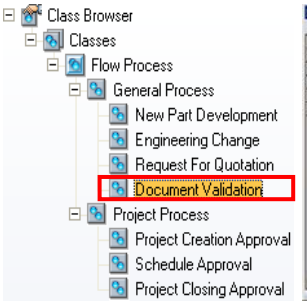
- Switch to Flow Chart tab and view it.

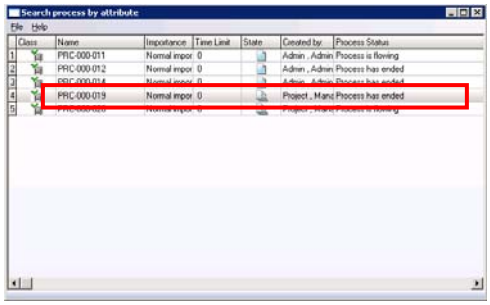
- Perform Accept Action on it.
- Check the Inbox. No process will be displayed for admin user.

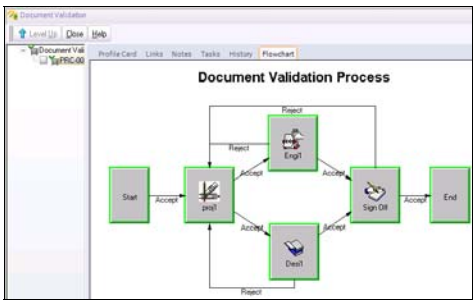


19. Click Logout.

20. Launch Workflow Manager to view the progress of the process.
    - Search for Document Validation process
    - Select the process and view it.
    - All the nodes are displayed as completed.
    - Close the Workflow Manager.

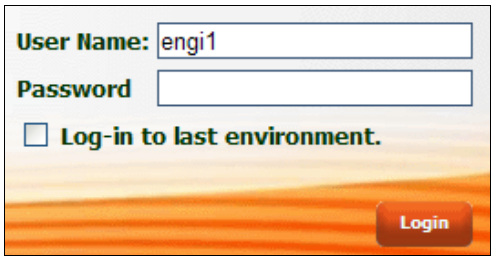




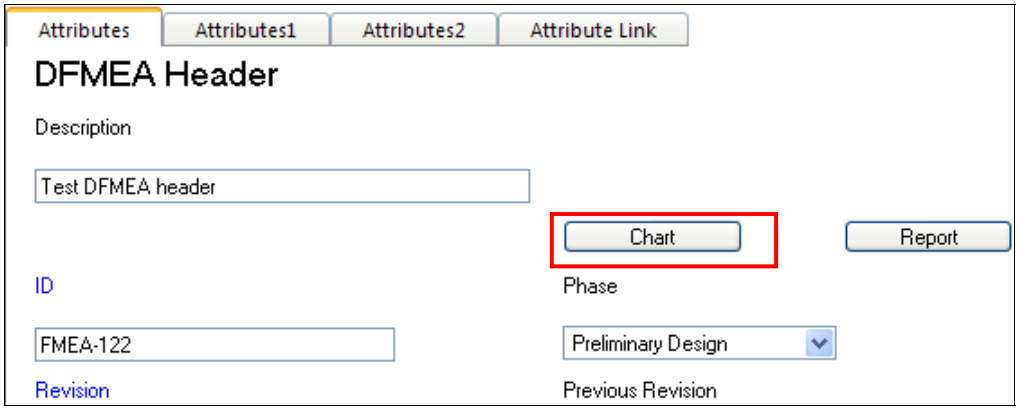


3.1.3 Phase 3: Project Execution

1. Log in as **engi1** and connect to the correct database.



- Click on the test project created.
- Choose FMEA Header.
- Click on Chart button.



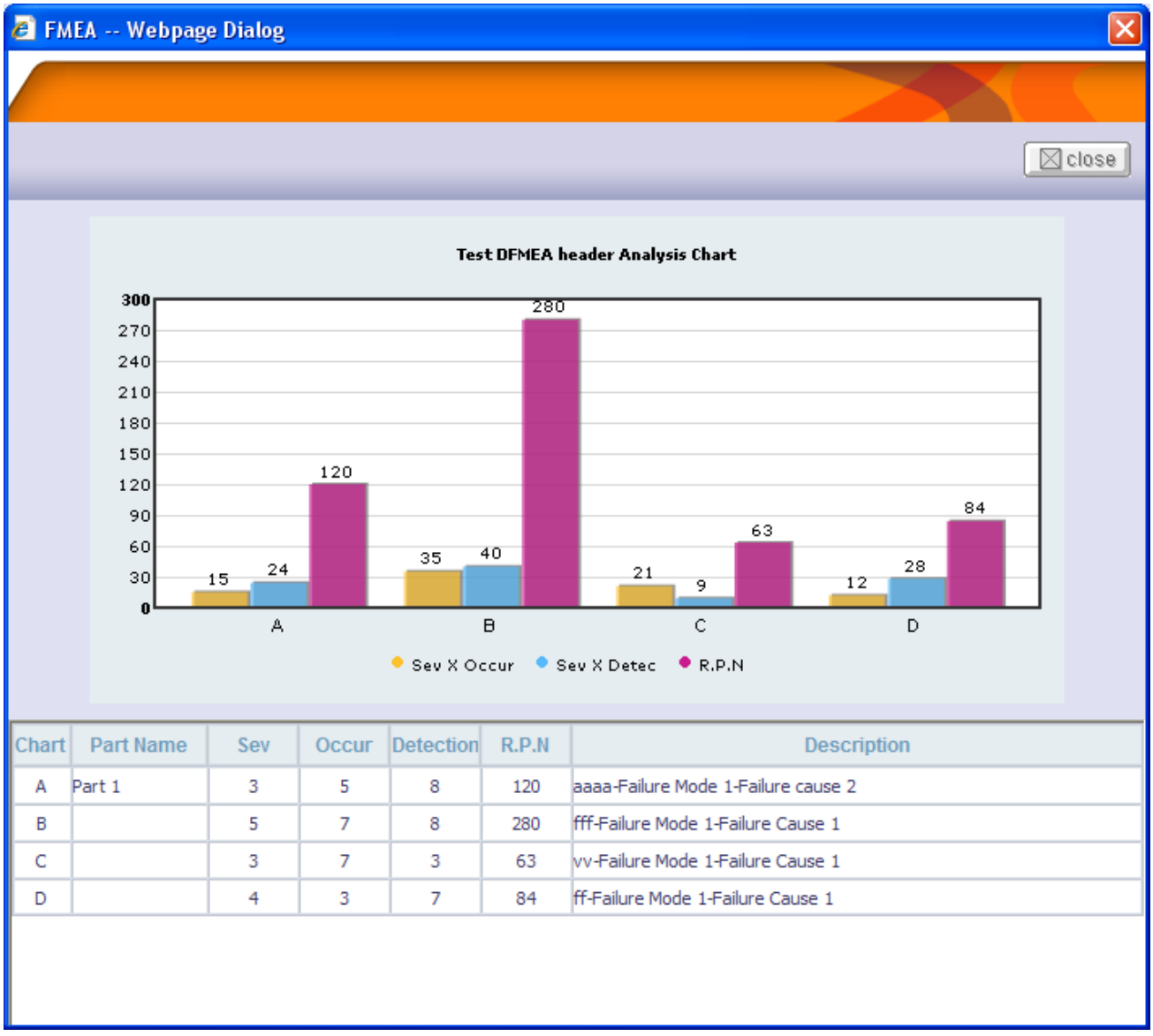
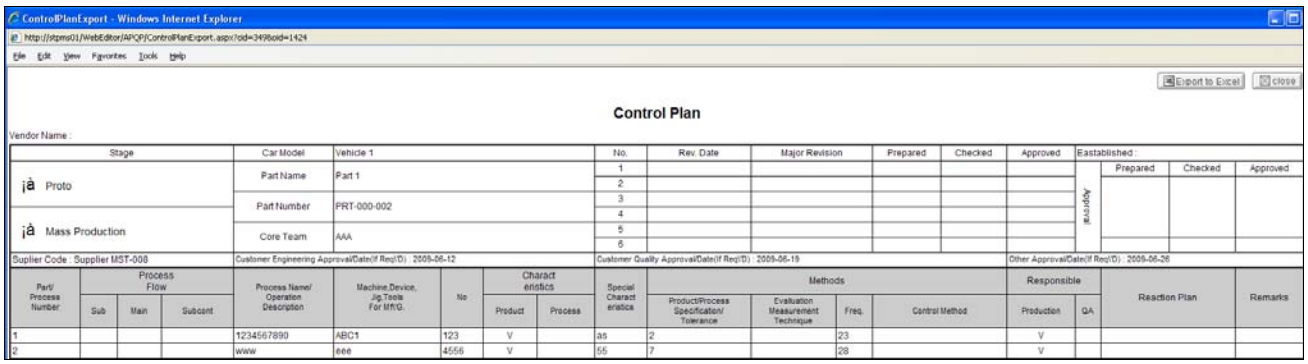
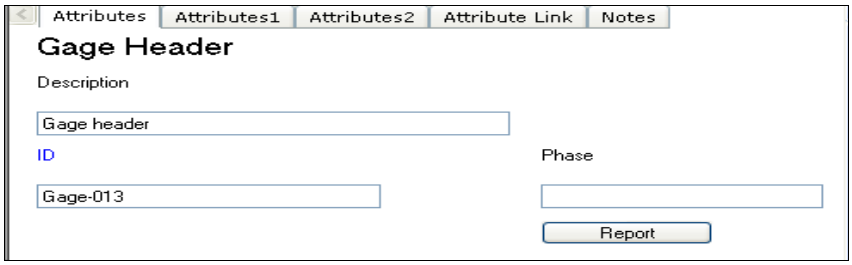


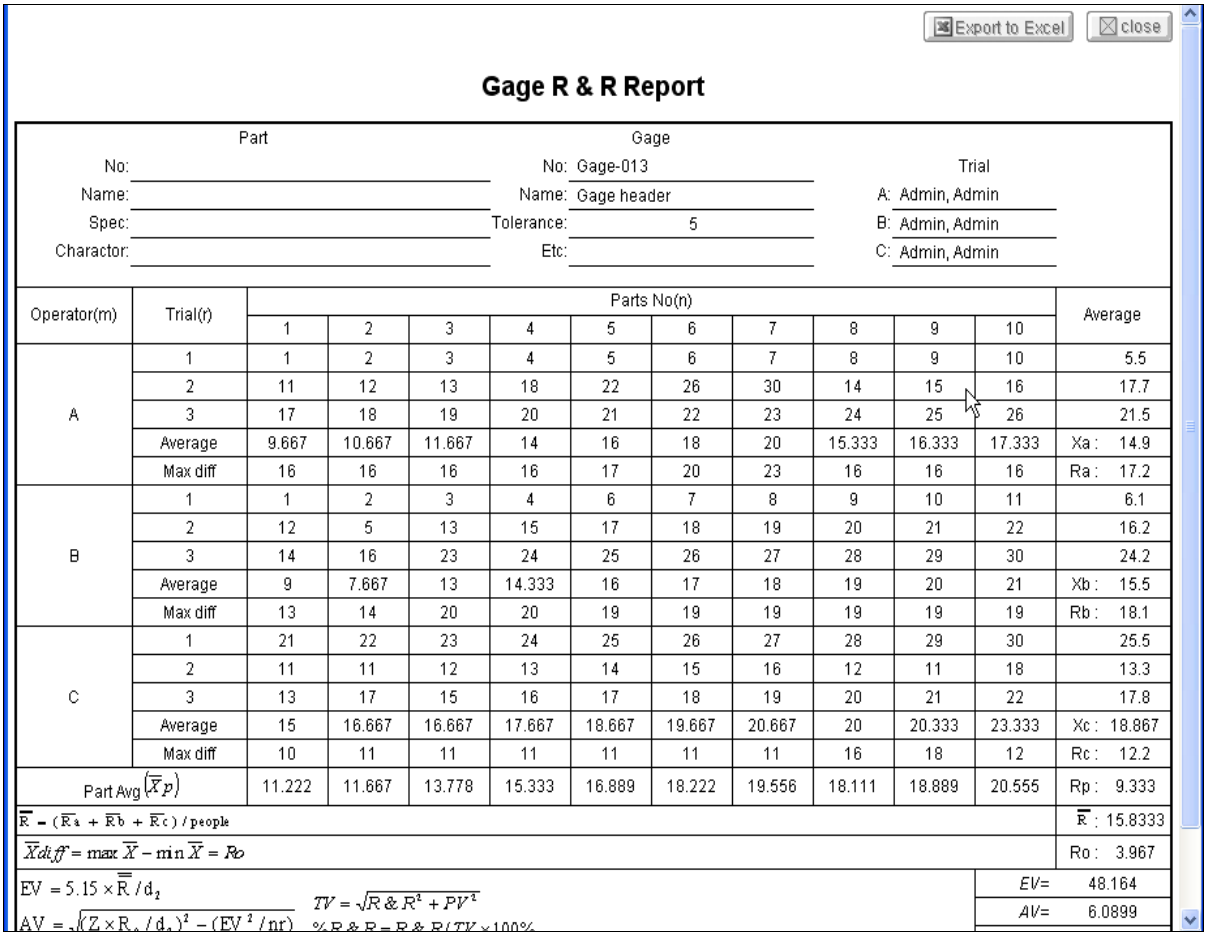
Chart	Part Name	Sev	Occur	Detection	R.P.N	Description
A	Part 1	3	5	8	120	aaaa-Failure Mode 1-Failure cause 2
B		5	7	8	280	fff-Failure Mode 1-Failure Cause 1
C		3	7	3	63	vv-Failure Mode 1-Failure Cause 1
D		4	3	7	84	ff-Failure Mode 1-Failure Cause 1

- Choose Control Plan Header.
- Click on Export button.



- Choose Gage Header.
- Click on Report button.





Operator(m)	Trial(r)	Parts No(n) 1	2	3	4	5	6	7	8	9	10	Average
A	1	1	2	3	4	5	6	7	8	9	10	5.5
	2	11	12	13	18	22	26	30	14	15	16	17.7
	3	17	18	19	20	21	22	23	24	25	26	21.5
	Average	9.667	10.667	11.667	14	16	18	20	15.333	16.333	17.333	Xa : 14.9
	Max diff	16	16	16	16	17	20	23	16	16	16	Ra : 17.2
B	1	1	2	3	4	6	7	8	9	10	11	6.1
	2	12	5	13	15	17	18	19	20	21	22	16.2
	3	14	16	23	24	25	26	27	28	29	30	24.2
	Average	9	7.667	13	14.333	16	17	18	19	20	21	Xb : 15.5
	Max diff	13	14	20	20	19	19	19	19	19	19	Rb : 18.1
C	1	21	22	23	24	25	26	27	28	29	30	25.5
	2	11	11	12	13	14	15	16	12	11	18	13.3
	3	13	17	15	16	17	18	19	20	21	22	17.8
	Average	15	16.667	16.667	17.667	18.667	19.667	20.667	20	20.333	23.333	Xc : 18.867
	Max diff	10	11	11	11	11	11	11	16	18	12	Rc : 12.2
Part Avg $(\overline{X}p)$		11.222	11.667	13.778	15.333	16.889	18.222	19.556	18.111	18.889	20.555	Rp : 9.333
$\overline{R} = (\overline{R}a + \overline{R}b + \overline{R}c) / people$												$\overline{R}$: 15.8333
$\overline{X}diff = \max \overline{X} - \min \overline{X} = Ro$												Ro : 3.967
$EV = 5.15 \times \overline{\overline{R}} / d_2$												EV= 48.164
$AV = \sqrt{(Z \times R_o / d_2)^2 - (EV^2 / nr)}$												AV= 6.0899

$TV = \sqrt{R\&R^2 + PV^2}$

$\%R\&R = R\&R / TV \times 100\%$

3.2 Help About APQP

1. Click on the SmartProject Application bar.
2. Now click on About AQ9 link.