

# Product Structure Synchronization for VPM V4 (PS9)

BPA Delivery 8 for V5R20SP6  
(V5.8)

***User's Guide***

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# 1 Introduction

Product Structure Synchronization for VPM V4 (PS9) is a solution for a ONE WAY Product Structure Synchronization for VPM V4 (PS9) of a CATIA V5 CATProduct stored in ENOVIA VPM V4 from the master PSN Product Structure.

It optimizes work methods using work-packpages and facilitates the management of CATIA V5 applicative data.

It aims at synchronizing the work package contained in a CATProduct against the assembly Structure Exploded in the VPMV4 database (in this way only). Associativity of applicative data should be preserve after synchronization. The Synchronization process is eased by automating the expand of the Structure Exploded associated to the work package and by additional commands helping create and save/update the work package in VPM and manage its structure.

## 1.1 Scope

- Define, capture and manage the “Work Context” used in the VPM database to generate the work package.
  - Based on PSN files.
  - Supports configured PSN (use of Configuration).
- Automate the creation of the work packages.
- Identify the differences between the work package Product Structure and the “Work Context” (PSN and/or Exploded Structure).
- Synchronize (totally or partially) the work package Product Structure.
  - Deleted, Moved, Replaced and Added Instances (parts or assembly nodes).
  - Change management: standard VPM for Part version & Document Revision ; and customer version-revision mechanism.
  - Intuitive Graphic interface.
  - Execution report.
  - AND... best preserves associativity of applicative data.

## 1.2 Value

- Structure Exploded is most often the preferred work method:
  - The optimal solution for relational design:
    - When part positions are managed by the assembly.
    - When multiple users work concurrently on a large project.
    - To facilitate the impact analysis of a modification.
  - When working on configured product (by variant or effectivity).
  - Digital Mock-Up management is done in Structure Exploded.
  - BUT, all work methods cannot be supported with Structure Exploded...
- Work packages(\*) are legitimately used to support specific work methods:
  - *Well suited for local or end-process engineering studies:*
    - *Structure is temporary disconnected from BOM.*
    - *Locally change/simplify product structure order & depth.*
    - *Assembly engineering that is not shared between users / departments (users exploiting engineering data).*

- *Ability to store Engineering data with different positions (for example for process assembly documentation).*
- *Allows to define product structures that contain data from different VPM environment without having to define a PSN structure.*
- *Allows to define product structures that contains assemblies provided by suppliers.*
- *Addresses specific work methods:*
  - *Creation of assembly drawing of multiple assemblies.*

## 1.3 Glossary

- **Instance ID:** each instance of a VPM part created in a PSN is identified by VPM by mean of a unique “instance ID”. When the product structure is opened in CATIA V5 from the PSN, these IDs are added as attributes to the corresponding CATIA V5 components. A mandatory prerequisite to the work package product synchronization is the storage of these IDs in the work package product so that the Synchronization process can retrieve the PSN instance corresponding to a given instance stored in the work package product.
- **PSN file:** file in which a PSN is captured at one time. The PSN file can be use to reopen the same PSN in dynamic or static mode, with Selected Instances or not. The Root part and the Configuration Handler used to explode the initial PSN from VPM database are captured in this file.
- **PSN product:** structure exposed product.  
Assembly in “Structure Exposed” mode coming from VPM. This assembly can be opened in a CATIA V5, from the VPM client, from Portal, or from a CATIA V5 CAA command. This assembly can be displayed in a CATIA session or only be loaded in memory.
- **Reference PSN:** PSN filename that is used to synchronize automatically the work package from.
- **Work package:** publication exposed product.  
Name given to a CATProduct in VPDM world whose assembly product structure contained in it is not visible by VPDM application.

## 2 Product Structure Synchronization for VPM V4 (PS9) User's Guide

### 2.1 *PS9 toolbars*

PS9 toolbars are available in the workshop Product.



Create / Edit a workpackage.



Synchronize a workpackage.



Add a component to a workpackage.



Open a VPM structure.



Identify a workpackage component.



Migrate workpackage to new root part version.

This is a new toolbar with additional commands:



Flatten WorkPackage



Move to Personalized Structure



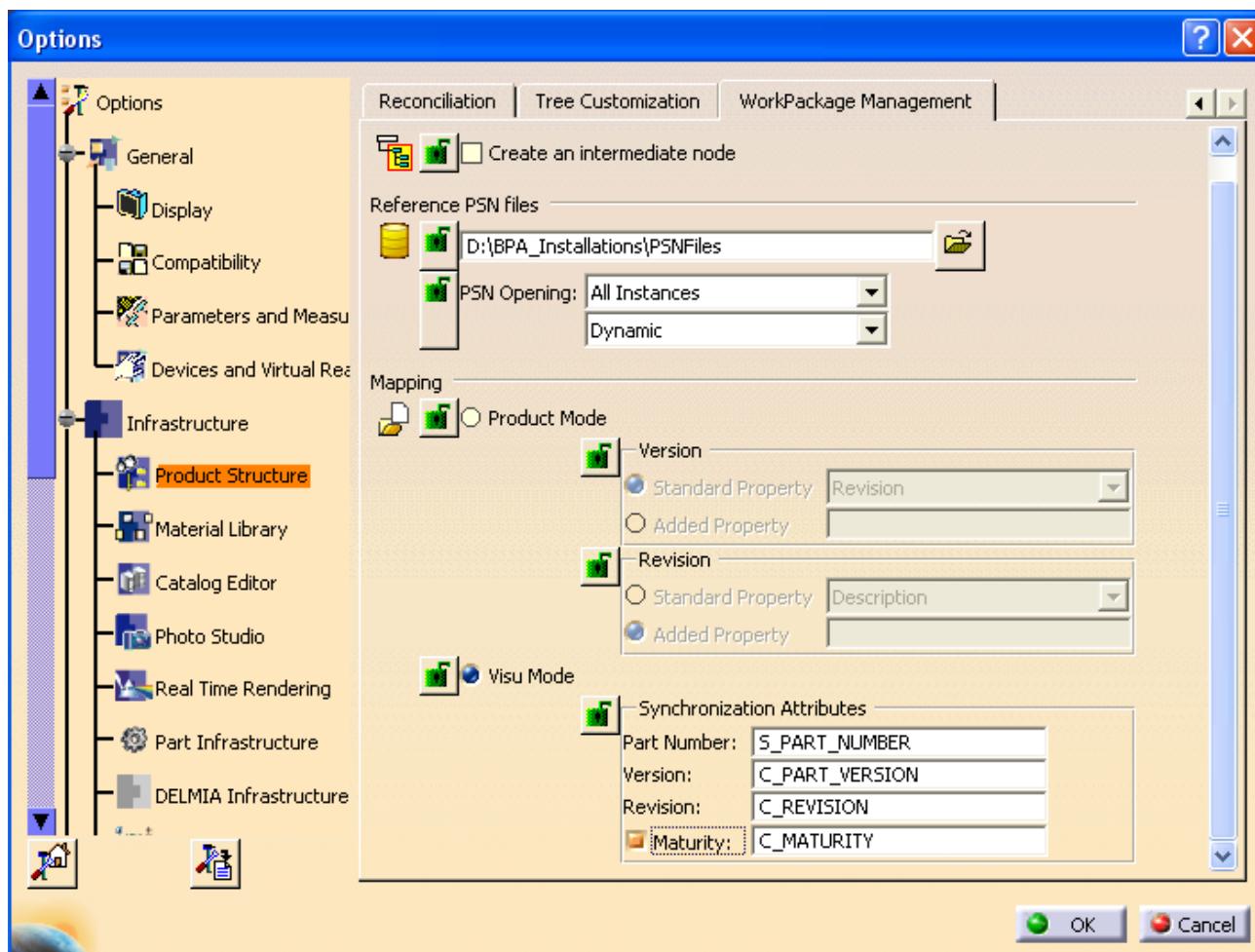
Update position in PSN



Update PSN file

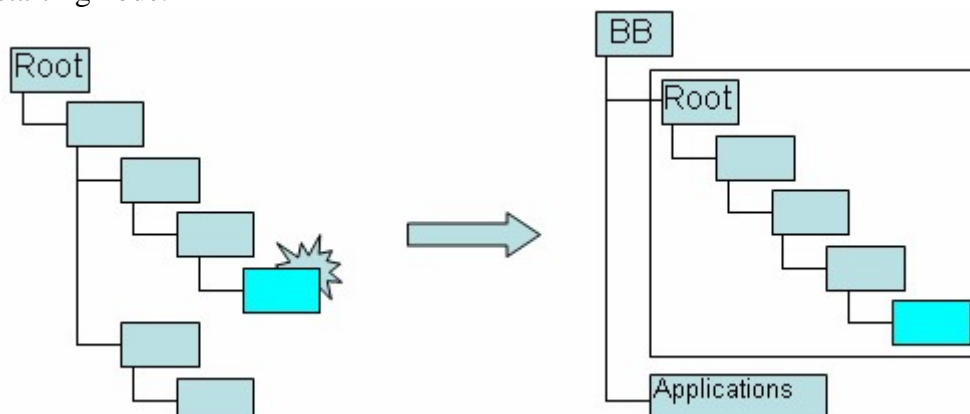
## 2.2 Settings

- PS9 settings are defined in a dedicated option panel.
- A new button can be activated for a customized version-revision mechanism.
- Combo Box is provided to add extra attribute for node parts. Attribute selected in that **must** be mapped to C\_MATURITY (for instance) in CV5 mapping Settings.

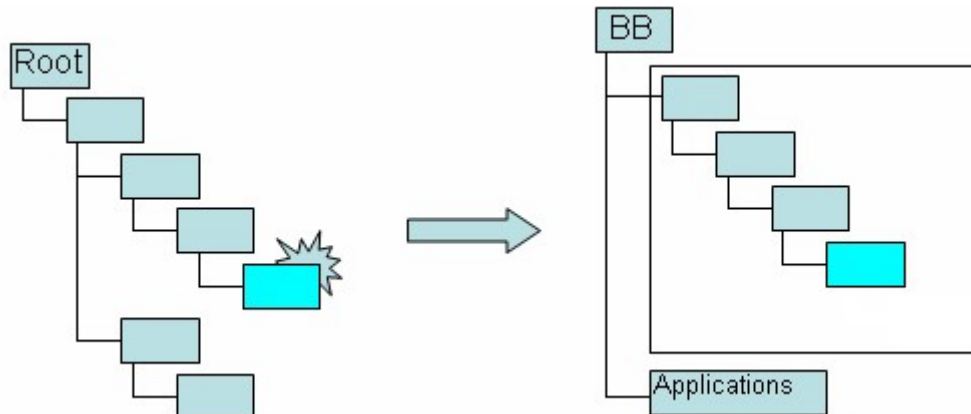


### Create an intermediate node:

If this option is selected, the root part of the PSN product will be copied as a child of the work package starting node.



Else the root part of the PSN product will not be taken into account for the work package creation.



### **Reference PSN files:**

Each work package is associated to a reference PSN file.

The PS9 options let the user:

- Choose a default repository for these reference PSN files.
- Choose the opening mode for the reference PSN files.

Available values are:

- All Instances.
- Selected Instances.

### **Mapping:**

These settings let the user specify the mapping between VPM attributes and CATIA V5 properties.

It exist 2 cases:

- For standard version-revision mechanism:

The two concerned VPM attributes are:

- VPM Part version.
- VPM model or document revision.

These attributes can be mapped on a standard CATIA V5 property or on a user defined one.

If no mapping is done for the revision (added property select for revision, with an empty field) then it will be retrieved from the VPM database.

- For customer version-revision mechanism

2 customer's attributes can be used

### **Performances:**

It is possible to work only in Visualization Mode when using PS9. It means that all necessary information will be retrieved directly in the database instead of using the standard mapping mechanism of attributes.

When the VisuMode is activated, you have to declare in which VPM attributes are stored the Part Number, the Version of the VPM part and the Revision of the document.



The difference between the two modes can be really significant when working with large packages containing a lot of V5 documents.

## 2.3 Create a workpackage

This command creates a CATProduct in session in which selected instances from a window containing the Structure Exploded are copied / pasted.

Objectives:

- Automates the creation of work packages.
- Creates automatically, store the .PSN file of the current PSN structure and store the information within the CATProduct.

### Workpackage creation main steps:

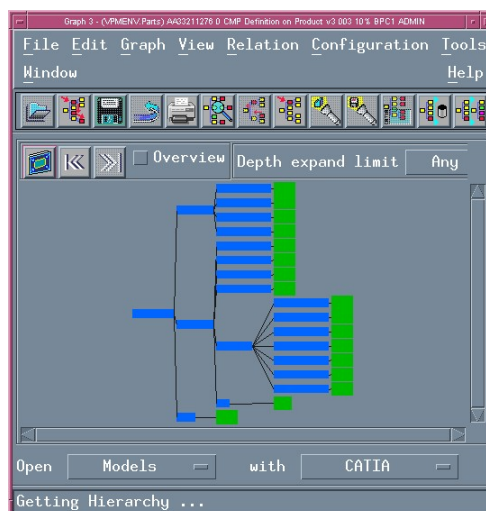
#### Step 1: launch applications.

On UNIX : launch a VPM session and start a CATIA V5 session from the VPM session (Tools / Execute / CATIA V5).

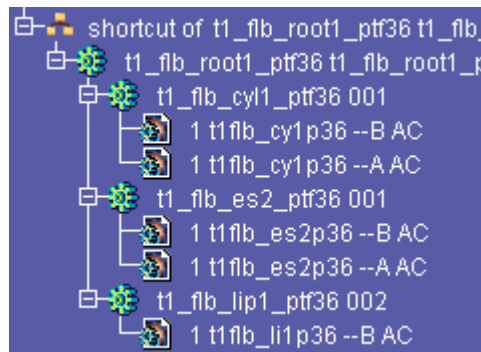
On Windows : launch a Portal 3DCom session and a CATIA V5 session including PS9 addin.

#### Step 2: open a PSN graph.

On UNIX: from VPM, open the exploded product structure psn graph and expand it with the proper configuration filter.



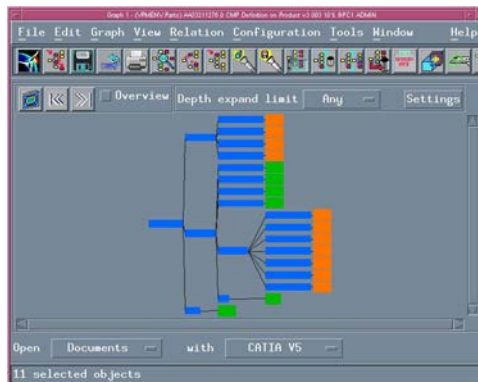
On Windows: from Portal 3DCom, open the exploded product structure tree and expand it with the proper configuration filter.



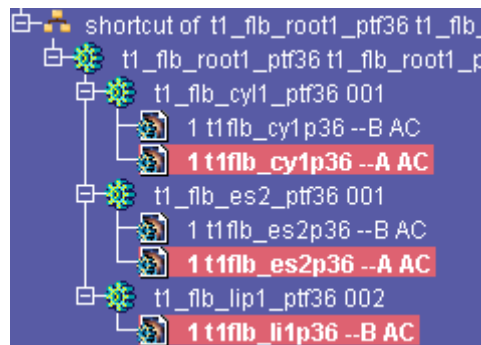
### **Step 3: load product.**

Select models and load them in the current CATIA V5 session.

On UNIX:




On Windows:

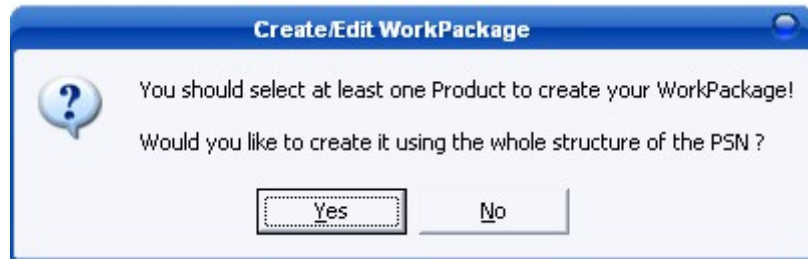


### **Step 4: create workpackage.**

In CATIA V5, select the root product of the opened document and click the “Create / Edit

workpackage” icon 

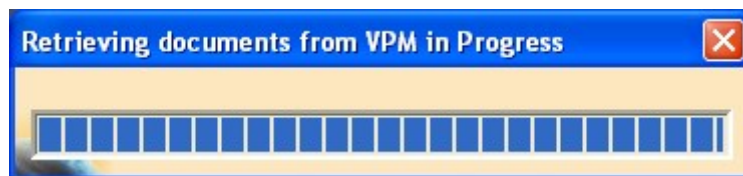
If you do not select the root product of the document, the following panel will be displayed and, depending on user’s choice, the command will be stopped or will create a work package with the whole PSN structure.



The opened document must come from VPM, otherwise the following error panel will be displayed and the command will be stopped.



If necessary, CATIA documents (V5 CATParts or V4 models) are automatically retrieved from VPM database and partly loaded in memory (state close to Visualization mode).

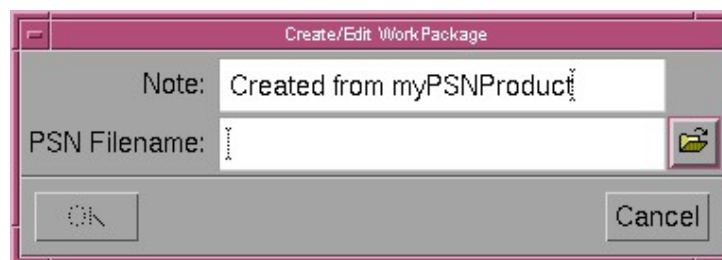



The workpackage creation panel is displayed.

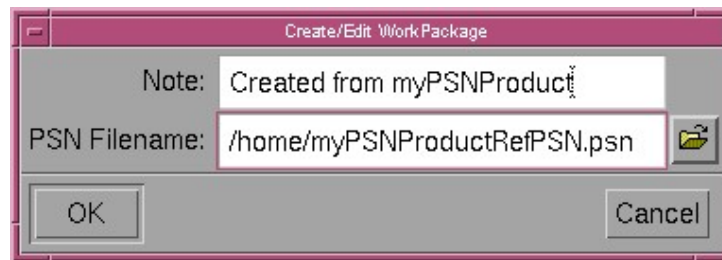
The “Note” field is filled with a default value “Created from XXX”, XXX being the selected root product part number.

Fill the “Note” and “PSN Filename” fields.

On UNIX:

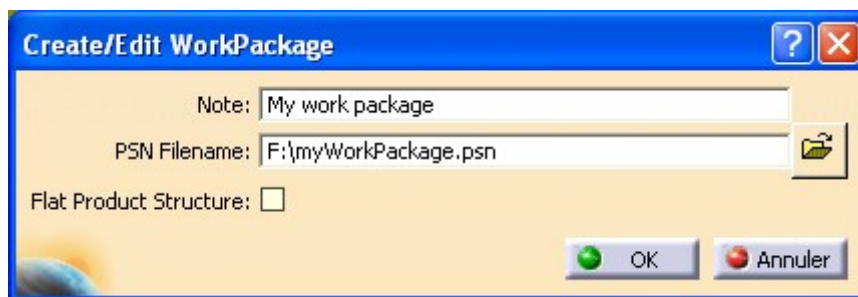


The “PSN Filename” field can be filled manually or using the file browser that is displayed when the  icon is clicked. The PSN file will be automatically be created.



Click OK.

On Windows:

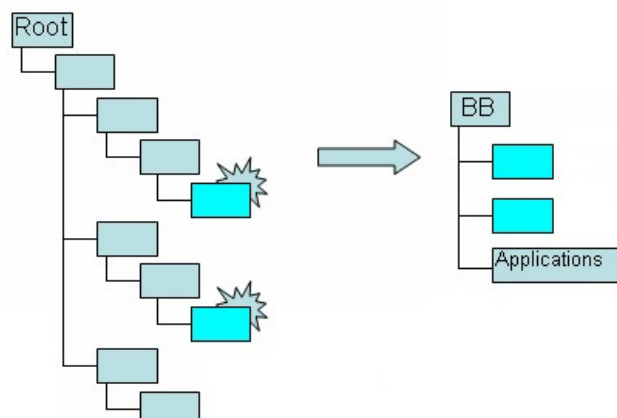


Click OK.

The workpackage is created by PS9. A new CATProduct document is created in the current CATIA V5 session. In this new workpackage:

- The PSN product root is copied / pasted as a child of the workpackage starting node if the option "Create an intermediate node" has been checked.
- Instances selected in the PSN product are copied / pasted.
- Intermediate nodes from the PSN product root to the selected instances are created in the work package as CATIA V5 components.
- The PSN file name and the creation note are stored in the workpackage.
- The PSN file is automatically generated from the VPM PSN graph.

If the "Flat Product Structure" option has been checked, the selected terminal parts of the PSN product are instantiated on a single level in the work package.




Save your workpackage in VPM.

Note: (1) only the product structure is created. Other type of data, such as assembly constraints, are not carried over.

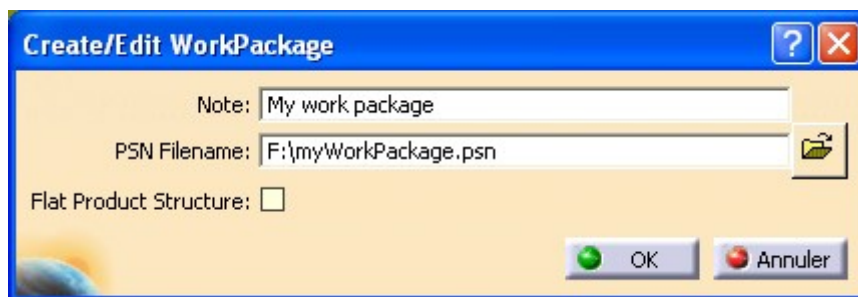
(2) A PSN file cannot be overwritten to avoid a data lost.

## 2.4 Edit a workpackage

To edit a work package it must be the active document in the CATIA V5 session.

Click on the “Create / Edit work package” icon 

The work package edition panel is displayed.



Through this panel it is possible to modify the note and the reference psn file associated to the edited work package.

## 2.5 Synchronize a workpackage

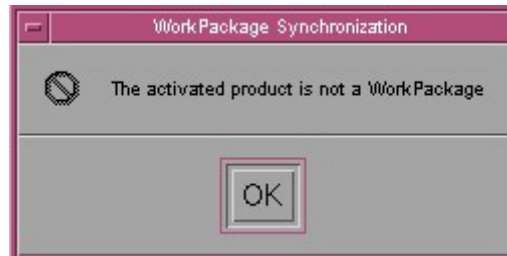
This command synchronizes a work package in session regarding its corresponding PSN product.

Objectives:

- Automates the synchronization of work packages.
- Detect Differences. Enables identify the differences between a work package and its corresponding PSN product:
  - Added instances.
  - Moved instances.
  - Deleted instances.
  - Replaced instances (terminal leaves or intermediate nodes).
  - Standard Version / Revision.
  - Customer version-revision
- Synchronization. Enables performing synchronization between work package and its corresponding PSN product:
  - Added instances.
  - Moved instances.
  - Deleted instances.
  - Replaced instances (terminal leaves or intermediate nodes).
  - Standard and customer Version / Revision.

## **Workpackage synchronization main steps:**

Synchronization command must be launched while the active document is a work package, otherwise the following error panel is displayed and the command is stopped.



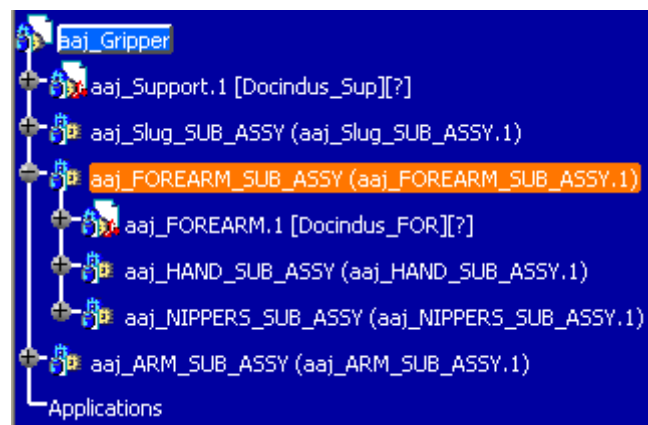
### **Step 1 (optional): select components to synchronize.**

By default, synchronization is applied on the complete work package. To restrict synchronization scope to a subset of the work package, select the instances defining the subset and launch the synchronization command.

Multi-selection is supported and only “object / action” sequence is possible.

If an intermediate node is selected, the whole sub assembly under this node will be part of the synchronization scope.

Example:



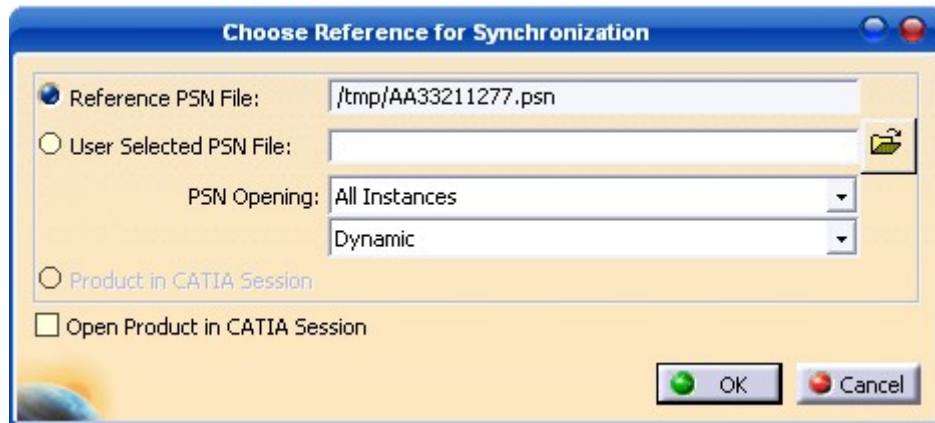
In that case, only the aaj\_FOREARM\_SUB\_ASSY sub assembly will be synchronized.

### **Step 2: choose reference for synchronization.**

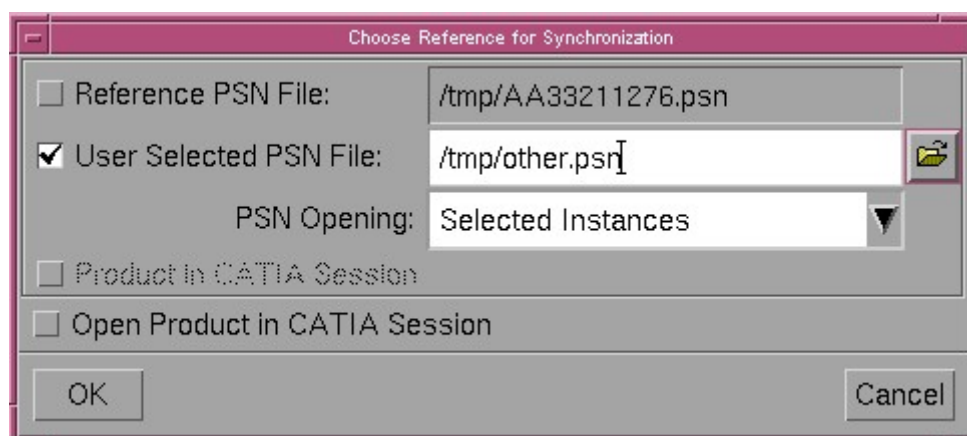
The “Choose Reference for Synchronization” panel is displayed to choose regarding which reference PSN product the synchronization must be done.

There are three possibilities:

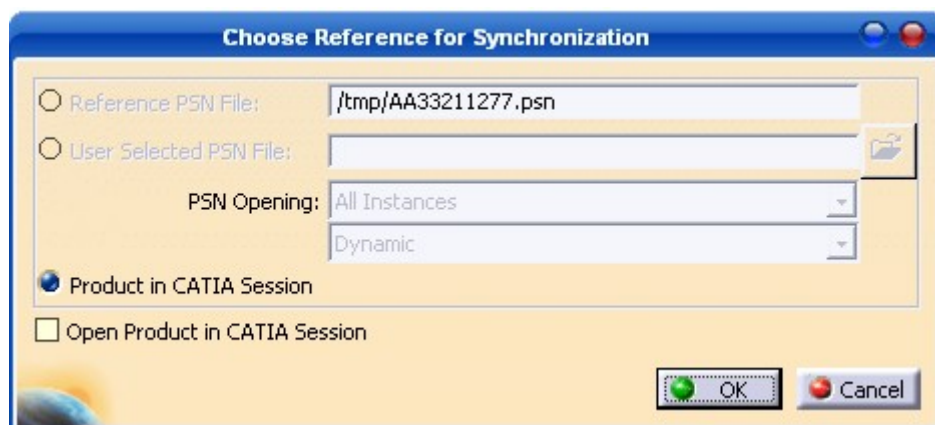
- Case 1: synchronize regarding the Reference PSN file, whose name and path are stored in the work package. This is the default mode. The PSN file name and path are displayed in the “Reference PSN File” read only field.



- Case 2: synchronize regarding a user selected PSN file.



- Case 3 : synchronize from a product already opened in the CATIA V5 session.



#### Options:

- “PSN Opening”: this option let the user choose the PSN opening mode. Possible values are “All instances” or “Selected instances” and “Dynamic” or “Static”.
  - The "All Instances" option will expand the PSN graph with all instances of the different sub-assemblies. The user will be proposed to add to the workpackage all the instances that were not originally included in the workpackage.



- The "Selected Instances" option will expand the PSN graph with only the instances that were originally included in the workpackage. All other instances will not be proposed to the user.
- Static: if you select the static mode, the parts are read from the file. This means they can be displayed even if they have been deleted from the database after the session was saved. Also, their attributes are read from the file, not from the database.
- Dynamic: if you select the dynamic mode, the part is read from the database and its attribute may change from when the session was stored.

Refer to the VPM user guide to have more details concerning the impacts of these options on the PSN opening.

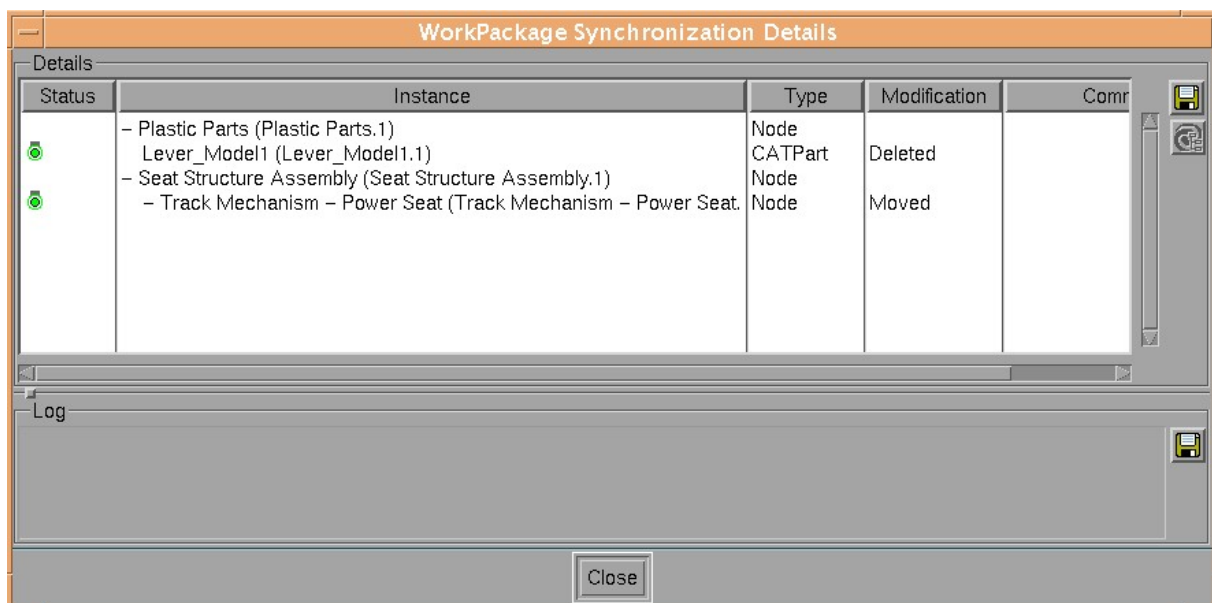
- “Open Product in CATIA Session”: enables to choose if the PSN product must be displayed or not in the current CATIA session. Having a CATIA window displaying the PSN product enables an extended usage of the “Synchronization Details” panel for graphical identification (selection, center graph, reframe on) but it is not mandatory.

### **Step 3: synchronization.**

Clicking “OK” in the “Choose Reference for Synchronization” panel launches the synchronization process. This process is divided into two steps:

- Computation of differences between the work package and the reference PSN product.
- Synchronization of differences.

After the computation of differences between the work package and the PSN product, the "Work Package Synchronization Details" panel is displayed. This panel lets the user have a view of the list of impacted elements. Synchronization is then applied, on user demand, for the selected elements.





## Row description:

- Status:
  - Traffic light meaning:
    - Green: Synchronizable instance.
    - Yellow: Synchronization operation is implicit or constrained / forced. May not need to be synchronized since it is impacted by an upper level synchronization.
    - Red: Not synchronizable instance (No Instance ID, Instance ID in conflict, Instance not belonging to the same Root Part).
- Instance name impacted by an operation:
  - Instance name:
    - Coming from the PSN product for “Added” operation.
    - Coming from the work package for operations (“Moved”, “Deleted”, “Replaced”, “Version” and “Revision”, customer version-revision mechanism).

Note: the name displayed in the panel is the same as the one in the specification tree, including if it has been customized with the option "Infrastructure + Product Structure + Node Customization".
- Type:
  - CATPart if the operation is on a leaf CATPart.
  - Model if the operation is on a leaf V4 model.
  - Node if the operation is on an intermediate Node.
  - Product if the operation is on a leaf CATProduct.
  - Customer ‘s document for customer’s version-revision mechanism
- Modification:
  - ADDED: the instance is not in the work package.
  - MOVED: the instance position in the structure Exploded has been modified.
  - DELETED: the instance in the work package does no longer exist in the structure Exploded.
  - REPLACE: the instance has been replaced in the structure Exploded.
  - VERSION: the part has a new version or a new revision in the Structure Exploded
  - REVISION: the part has a new version or a new revision in the Structure Exploded
  - VERSION/REVISION: the part has a new version and a new revision in the Structure Exploded
  - ID. CHANGE: the instance is similar (same position and same version/revision) but Instance ID has been modified in VPM.
  - REPLACED&MOVED: the instance has been replaced in the structure Exploded and its position has been modified.
  - For standard and customer’s version-revision mechanism
    - VERSIONED&MOVED: the part has a new version in the Structure Exploded and its position has been modified.
    - REVISIONED&MOVED: the part has a new revision in the Structure Exploded and its position has been modified.
    - VERSIONED/REVISIONED&MOVED: the part has a new version and a new revision in the Structure Exploded and its position has been modified.

- Comment:
  - In case of a replace: indicates the part numbers of the replaced and replacing parts.
  - In case of version: indicates the versions and revisions of the replaced and replacing parts.

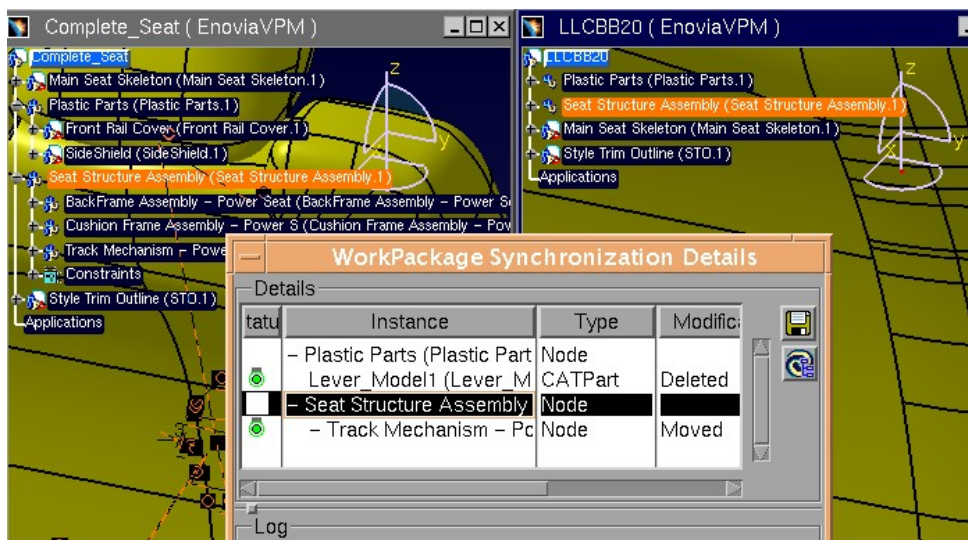
Note: document's revision can only be taken into account using the "Product in CATIA session" as the reference product structure.

#### Panel usage:

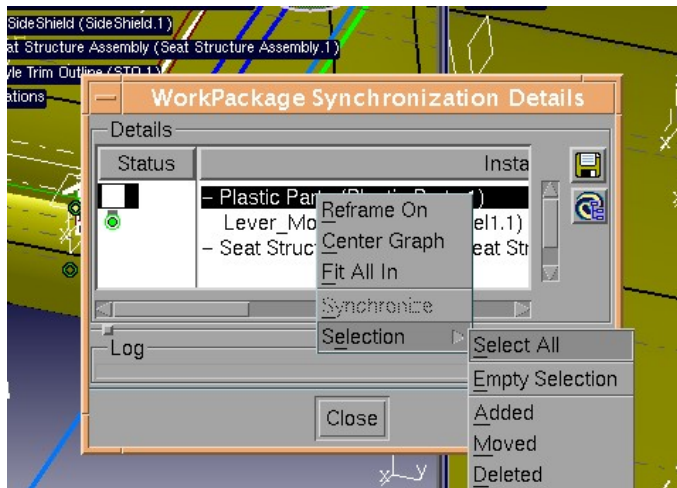
- Click the top right Save button to export the Report to a text file.




- Clicking on an instance name enables select and highlight this specific instance in the product structure trees and in the visualization too, in both windows.

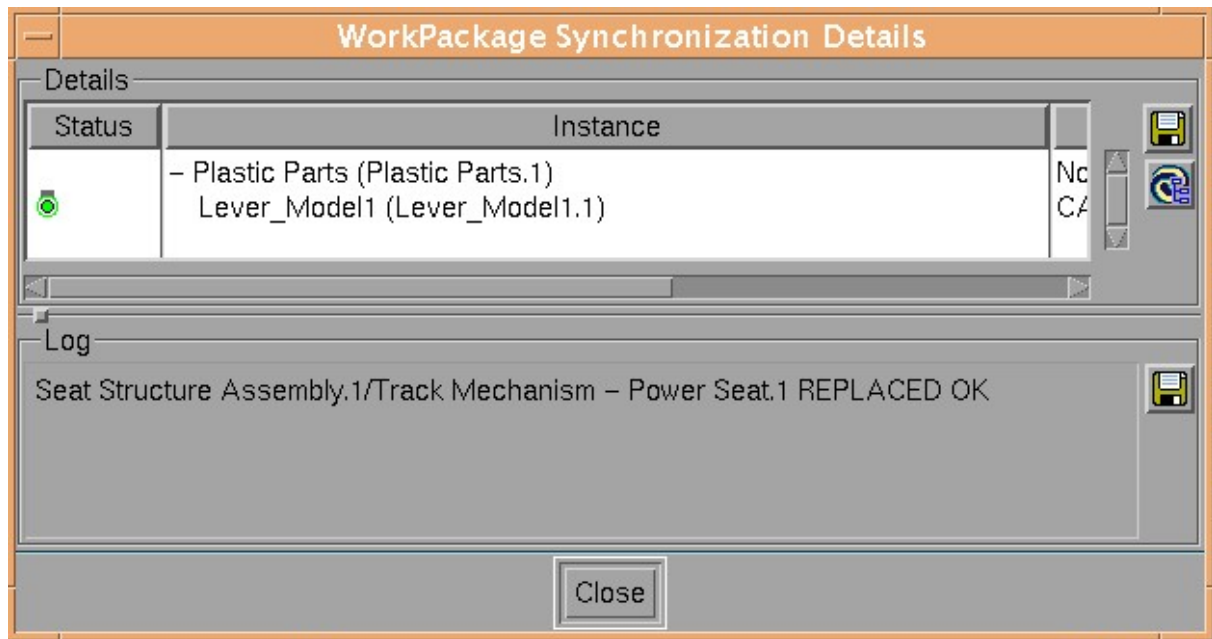



- Click 3<sup>rd</sup> Mouse button to get contextual menu on an instance:
  - Reframe On
  - Center Graph
  - Synchronize
  - Select Sub-Menu with options Added, Moved, Deleted, Replace and Version/Revision to select and highlight all the synchronizable instances that are affected by such difference type.
- Click in initial CATProduct, to manipulate graphical functions like zoom....;



- Clicking on the column title will sort the columns by this criteria:
  - Status column: rows are orders by traffic light colors: Green – Yellow – Red.
  - Instance column: alphabetic order.
  - Type column: alphabetic order.
  - Operation column: grouping affected/ not affected instances.
- When instances are selected in this panel, click 3<sup>rd</sup> mouse button to get contextual menu and push on Synchronize menu to proceed with the Synchronization of the selected instances, or click on the “Synchronize Selected Elements” icon.
 
- Once instances are synchronized, the lines are removed from the list in the panel. The log area at the bottom of the panel is updated.

Note: The synchronization mechanism is based on CATIA V5 product structure operators, such as changing position matrices, replacing components, etc... All efforts are made to minimize impacts on downstream applicative data pointing to synchronized instances. For example, it is very important to replace part in the PSN structure using "Replace from Clipboard" rather than a "Cut + Paste" as the second option will most likely break applicative links as a Delete + Add operation will be performed.

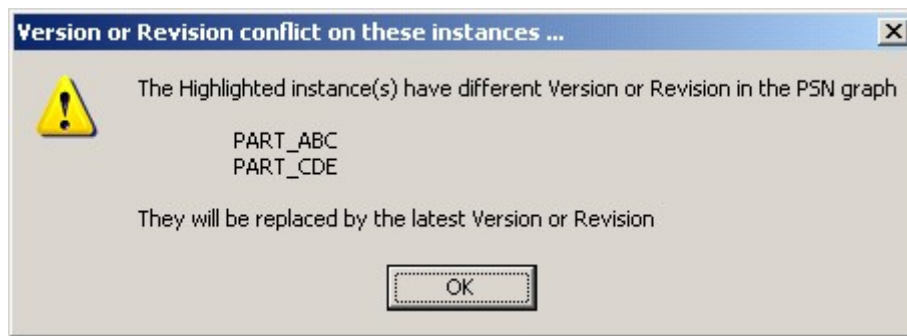


- Click the Save button to export the Log to a file.  

- Click Close to leave the command.

### Synchronization rules

1. The PSN product and the work package must have the same root part. In the work package, the root part coming from the PSN product can be located at the second level if option “Create an intermediate node” is activated.
2. The Top-down sequence of instances from the root part to leaves must be consistent. This consistency check is performed by analyzing the Instance ID on parent-child relationship. If an inconsistency is found, the instance and its sub-assembly will not be taken into account by the synchronization process. This might occur if the user performs a copy / paste or cut / paste operation in the work package. These instances will be displayed with the RED traffic light.
3. If the consistency check finds two instances with the same Instance ID, both instances and their sub-assemblies will not be taken into account by the Synchronization process. This might occur if the user performs a copy / paste operation in the work package.
4. Synchronizing an instance for a different version/revision will force the synchronization of all instances of the same part number. A dedicated error message mentioning the part number in conflict will inform the user that all

instances of this part will be synchronized.



5. Sub work packages case:  
 A work package 1 can be copied / pasted in a work package 2 using the standard CATIA V5 copy / paste function. In that case, the work package 1 is considered as a “sub work package” in the work package 2 context. Sub work packages are not taken into account by the synchronization process. In our case, the synchronization of work package 2 will skip work package 1. To synchronize both work packages 1 and 2, first synchronize work package 1 product and then synchronize work package 2 product. The general synchronization methodology concerning sub work packages is to synchronize from the inner work packages to the outer ones.

## 2.6 Add a component to a workpackage

This command must be launched while the active document is a work package, otherwise an error panel is displayed and the command is stopped.

By selecting this command, instances selected in the PSN product can be copied / pasted in the current work package.

It is mandatory:

- To have the PSN product already loaded in the CATIA session in addition to the work package product before activate this.
- To have only two CATProduct documents opened in the CATIA session.

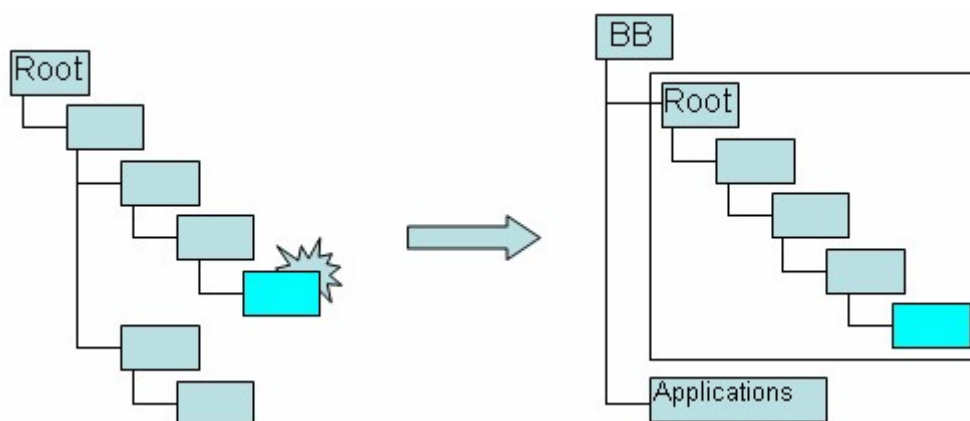
### **“Add to work package” main steps:**

- Activate the work package product window.
- Launch “Add to work package” command
- Select instances from PSN product window.
- The instances are copied in the work package with their instance ID informations.

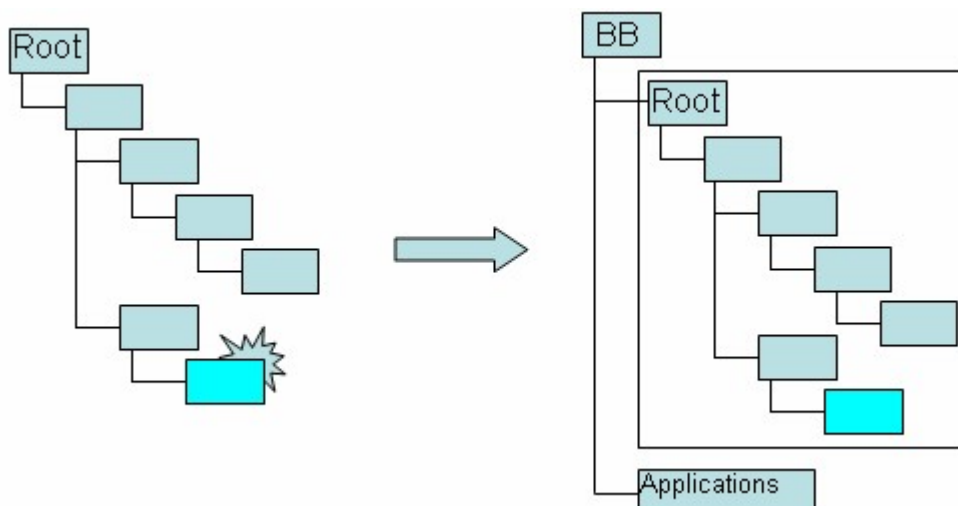
Using this command instead of the standard “copy / paste” command allows the instances to be copied with their PDM ID, which is necessary to take them into account later in the synchronization process. Instances added in the work package using the standard “copy / paste” command will not be taken into account later by the synchronization process since the lack of PDM ID on these elements will not allow the synchronization engine retrieve the corresponding components in the reference PSN product.

### Add to WP rules

1. The work package and the PSN product must have the same root part.
2. If the structures do not have the same root part, the command will issue a warning while pasting instances without populating the Instance ID. Such instances will not be taken into account by synchronization process.
3. When the command is used on sub-assembly nodes, all the children instances will also receive their own Instance ID.
4. All the intermediate parent/child nodes from the root part to the selected instances are created in the work package.

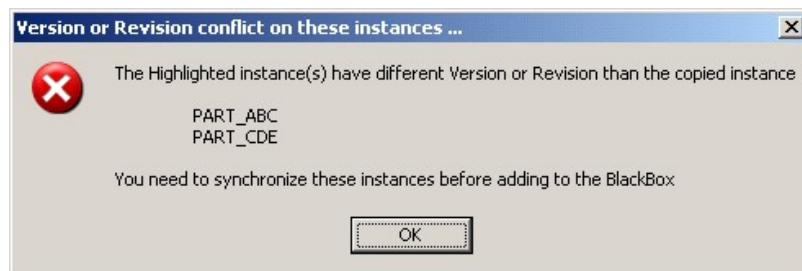


5. When running subsequent copy / paste action, existing sub-structure in the work package will be reused as long as the copied intermediates match the Instance ID, starting from the root part of the PSN product.





6. Pasted Instances will be kept selected and highlighted after command completion so that the user can easily visualize the result of the copy operation.
7. Copying an instance that has a different version/revision level compared to an existing instance of the CATProduct (Publication Exposed) will fail. A dedicated warning mentioning the part number in conflict will inform the user that the instances of this part will need to be synchronized and re-run the Add to work package command.



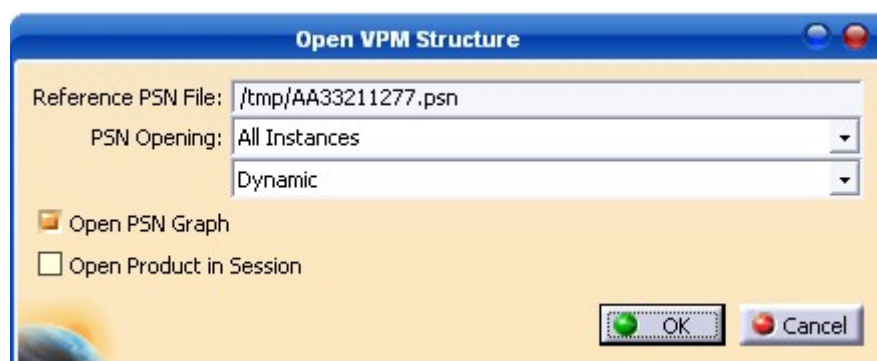
8. The command supports multi-selection.

## 2.7 Open VPM structure

This command, launched from a work package active window, let the user open the reference PSN graph and / or load the PSN product in the current CATIA session.

### “Open VPM Structure” main steps:

- Launch “Open VPM Structure” command.  
The “Open VPM Structure panel” is displayed.



- Options:
  - “PSN Opening”: this option let the user choose the PSN opening mode. Possible values are “All instances” or “Selected instances” and “Static” or “Dynamic”. Refer to the VPM user guide to have more details concerning the impacts of these options on the PSN opening.
  - Open PSN Graph: open the reference PSN file.
  - Open Product in Session: open PSN product in CATIA session.

## 2.8 Identify a workpackage component

This command enables the user to identify (highlight) in the PSN Graph and in the corresponding CATIA exploded structure (if opened), the instances he has selected in the work package. The highlighted instances have the same Instance ID in both windows.

### Identify In PSN rules:

- The PSN graph and the CATProduct (Publication Exposed) must have the same Root part.
- If the Selected instance belongs to a collapsed branch of the PSN graph or in the Structure Exploded window, the last visible node of the collapsed structure is highlighted.

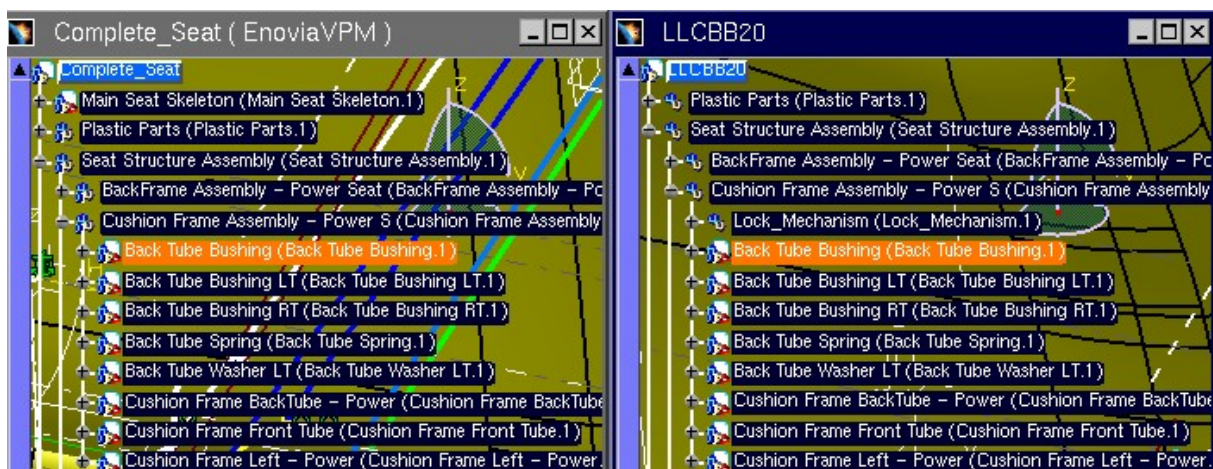
### Identify In PSN main steps:

- Select instances in the work package window
- Select the “Identify In PSN” command
  - Corresponding instances in the PSN graph are highlighted.
  - If the exploded structure opened in CATIA, the corresponding instances are also highlighted in that window.

Note: if the instance is not visible in the PSN Graph (because a higher node in the graph is collapsed), the last expanded node in the graph will be highlighted.

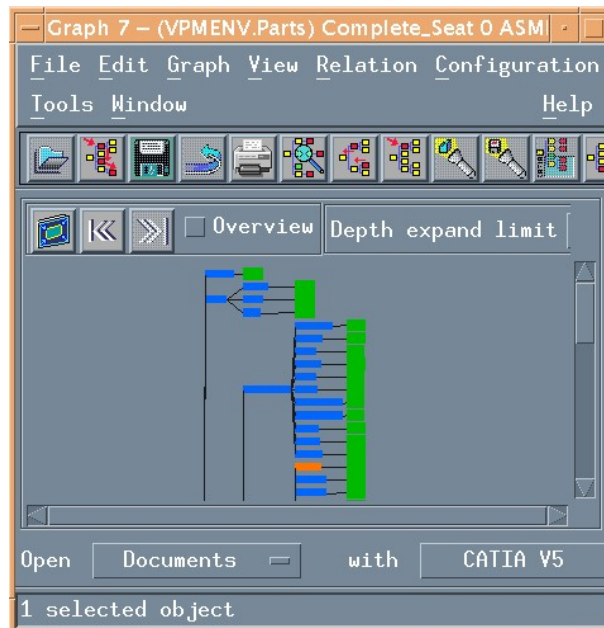
### Example of “Identify in PSN”:

CATIA side:



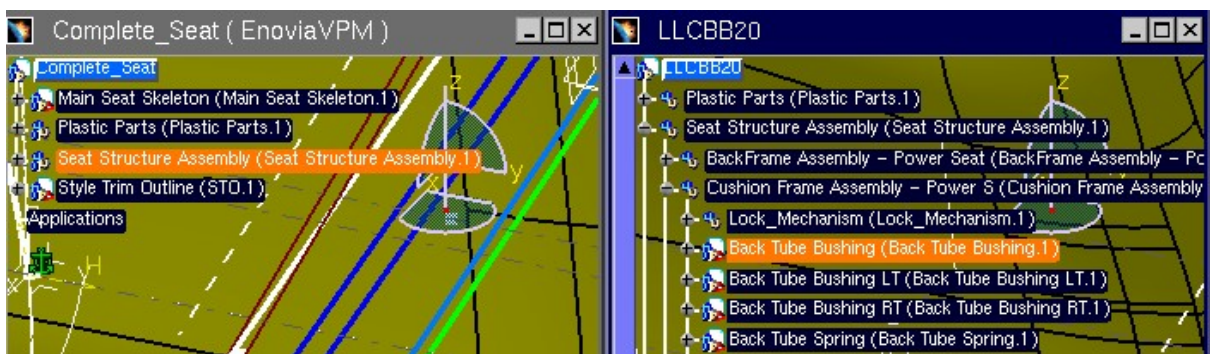
PSN graph side:



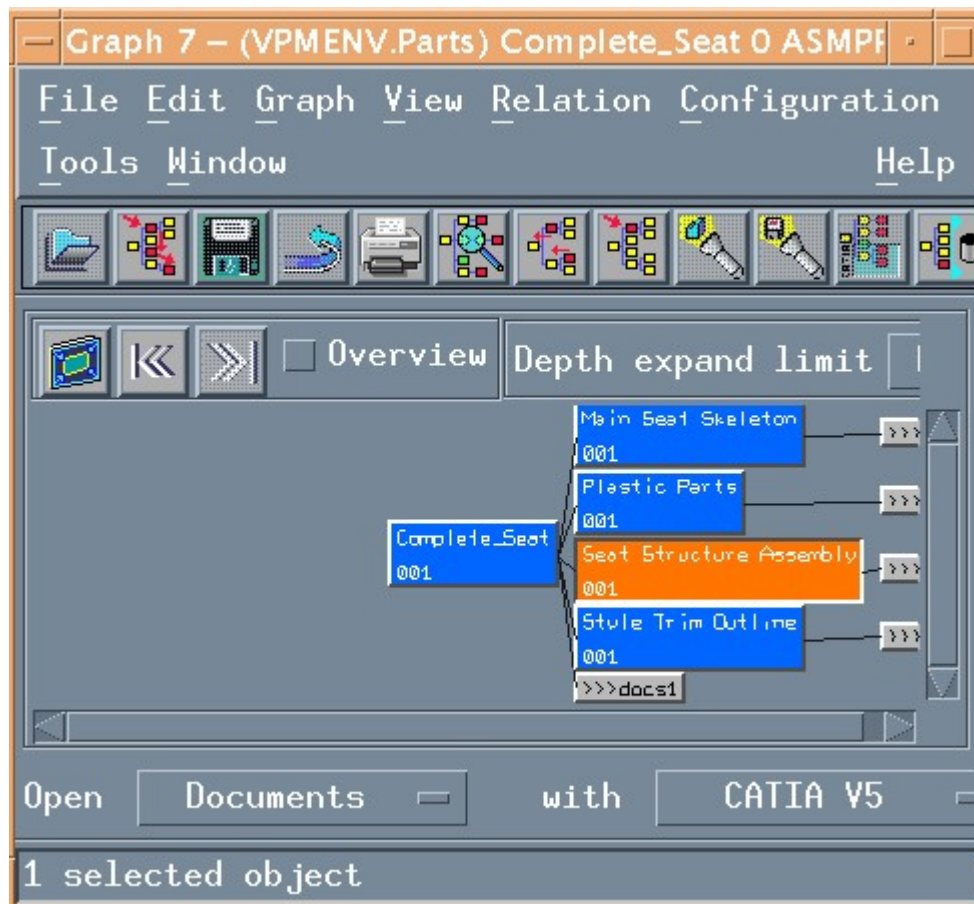


### **Example of “Identify in PSN” with collapsed branch:**

CATIA side:



PSN graph side:



## 2.9 Migrate workpackage to new root part version

This enhancement gives the capability to synchronize a work-package regarding another version of the PSN product root part.

This capability is obtained through a migration process of the work-package from a given PSN product root part version to another.

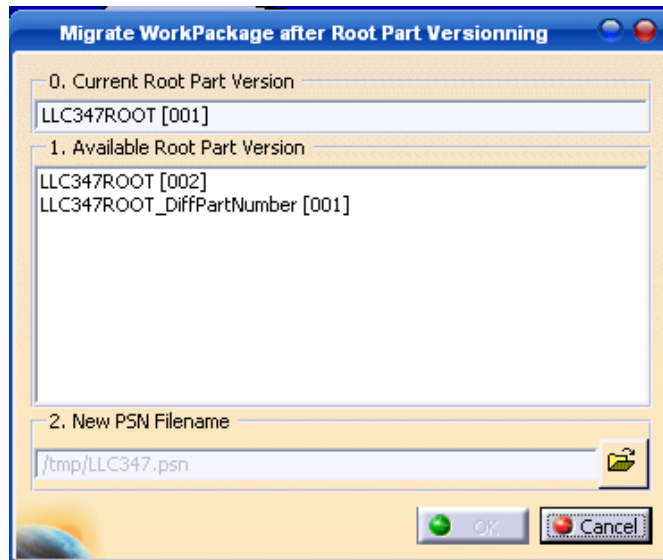
### Migrate main steps:

#### Pre-conditions:

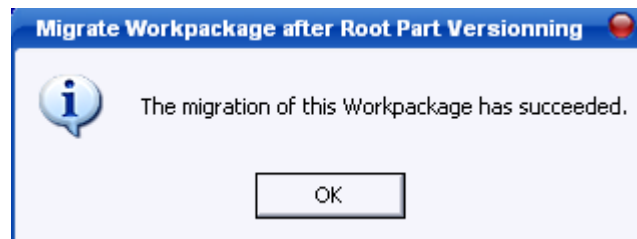
- The work-package has been created using PS9.
- The work-package is up to date regarding the corresponding PSN product.

#### Command processing:

- From a PS9 work package, click " Migrate workpackage to new root part version" icon.
- A panel is displayed which contains the existing versions of the root part (with same or different part number).



- Select the target version and click OK.
- If the migration succeeds the following panel is displayed :



#### Post-conditions:

- Each work-package component ID has been updated so that it refers to the target version.
- The PSN file has been update so that it refers to the target version.

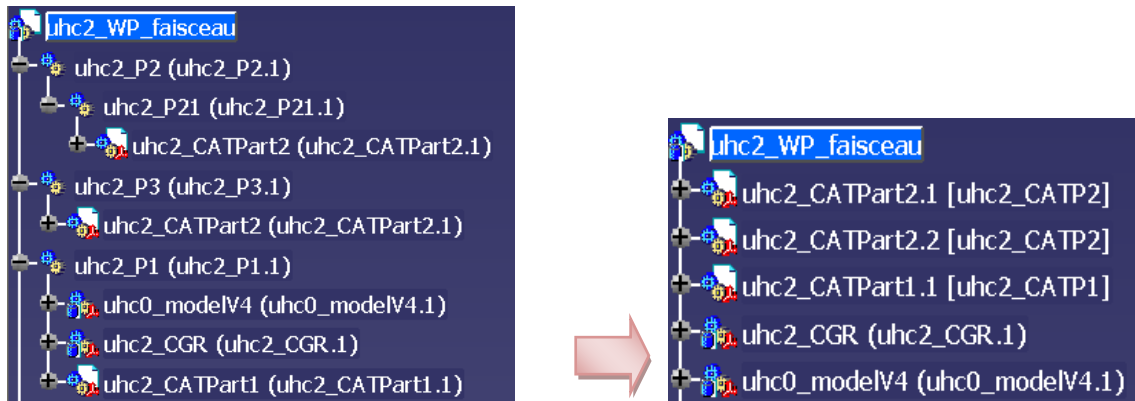
## **2.10 Flatten WorkPackage**

This new command gives the capability to flatten a WorkPackage by removing all the intermediate nodes of its structure, after it has been created. Note that the option is still available during the creation of the WorkPackage (see section WorkPackage creation).

This command can be very useful when working with structures that have a depth higher than 5 levels.

#### **“Flatten WorkPackage” main steps:**

- Launch “Flatten WorkPackage“ command.
- If the WorkPackage has an intermediate node, a panel will pop up to ask the user if he/she wants to keep it or to remove it.



## 2.11 Move to Personalized Structure

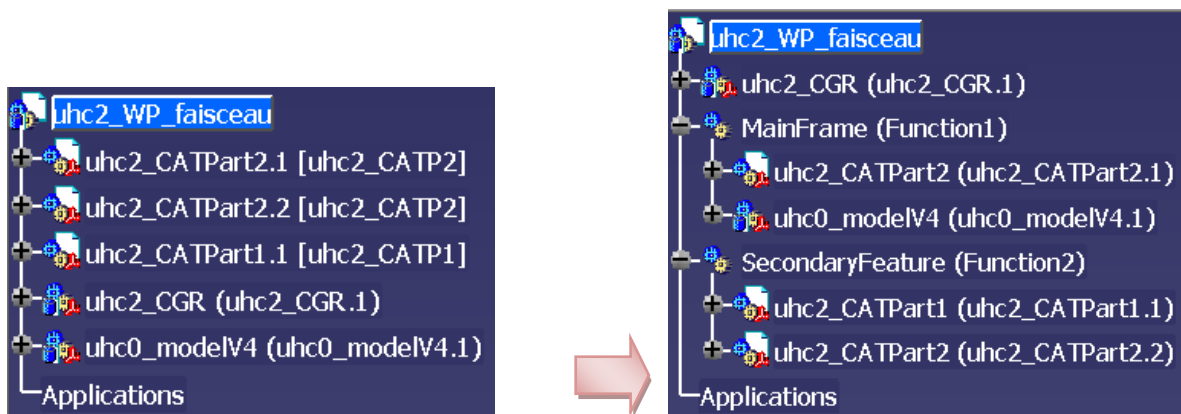
This new command allows the user to reorganize the WorkPackage structure, once it has been flattened, by creating new nodes.

### “Move to Personalized Structure” rules:

- The WorkPackage must be flattened

### “Move to Personalized Structure” main steps:

- Insert new component
- Select the instance to be moved
- Select the command “Move to Personalized Structure”
- Select the newly created component in the tree



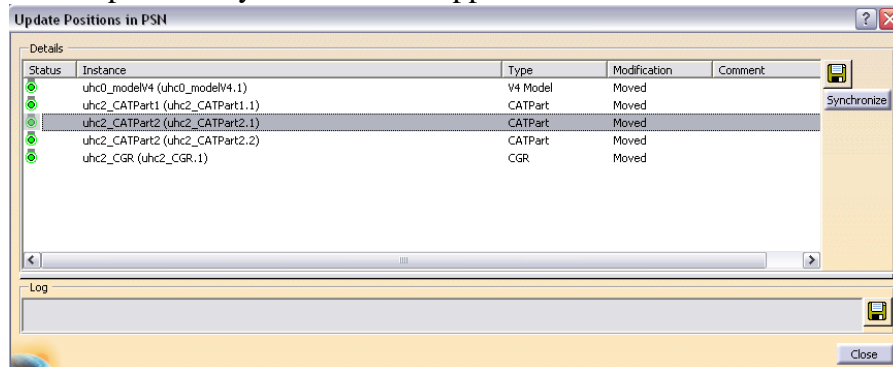
## 2.12 Update Position in PSN

This new command allows the user to make a reverse synchronization from the WorkPackage towards the PSN. It retrieves the position of a part in the WorkPackage to update its position in the PSN structure.

**This reverse synchronization can only be done for positioning!**

### “Update Position in PSN” main steps:

- Launch “Update Position in PSN” command.
- The same panel as Synchronization appears



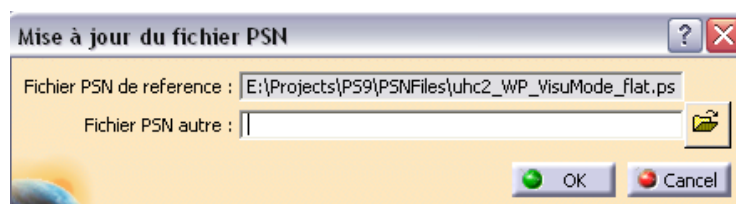
- Follow the same steps as for the synchronization method

## 2.13 Update PSN file

This new command gives the capability to update an existing PSN file associated to the WorkPackage or to recreate a new one, according to the current structure of the WorkPackage.

### “Update PSN file” main steps:

- Launch “Update PSN file” command.
- The following panel appears:



- To update the currently associated PSN file (which path is showed in first field), press OK. To create a new PSN file, enter its name in the second field and press OK.