DMU Space Engineering Assistant User Guide

Overview

Welcome to the *DMU Space Engineering Assistant User's Guide*. This guide is intended for users who need to become quickly familiar with the DMU Space Engineering product Version 5 Solution.

This overview provides the following information:

DMU Space Engineering Assistant in a Nutshell

DMU Space Engineering Assistant shortens design cycle time in concurrent environment through the capability it gives the designers to check the consistency of their design with the data stored in ENOVIA V5 while they are working. This is done thanks to interference analysis piloted by Knowledgeware rules allowing best practices compliance at the company level. Interference analysis results can then be stored in ENOVIA V5.

Thus, DMU Space Engineering Assistant fits the needs of designers working in a collaborative environment, in industries dealing with large assemblies (shipbuilding, automotive, aerospace, etc.).

Description

DMU Space Engineering Assistant checks the consistency of a design with the data stored in ENOVIA V5 according to pre-defined clash analysis rules allowing shorter design cycle time.

- Defines knowledgeware rules that will pilot clash computation
  - Specifies the computation type (clearance, contact, clash) and the components on which the clash computation must be applied
  - User/company benefits : automation, productivity gains, best practices/standardization, more accurate and relevant clash results
- Performs interference analysis according to predefined clash rules between in-session component (s) and components stored in ENOVIA V5.
  - Interference analysis computation is done on a dedicated server
  - This interference analysis occurs when a component is created or modified in CATIA V5
  - This interference analysis occurs when a set of components are moved in CATIA V5
  - User benefits :
    - while working a designer can check the consistency of his design with the stored data in ENOVIA V5
    - productivity and shorter design cycle in concurrent environment

- Stores the interference analysis results in ENOVIA V5
  - Browses the interference analysis results and manage conflicts
    - The user can choose the status of conflicts (irrelevant, relevant)
    - Dedicated browser presenting the interference analysis results
    - The user can also comment conflicts and filter them
  - Loads from ENOVIA V5 the components interfering with the in-session components and the relevant interference analysis results
  - Stores automatically interference analysis results when storing the in-session component in ENOVIA V5
  - Interferences are detected between user sessions data and any part effective in any configuration

Before Reading this Guide

Before reading this guide, you should be familiar with basic ENOVIA and CATIA Version 5 concepts. Therefore, we recommend that you read the *Infrastructure User's Guide* that describes generic capabilities common to all Version 5 products. It also describes the general layout of V5 and the interoperability between workbenches.The *Engineering Life Cycle User's Guide* may prove useful to understand ENOVIA cocnepts and learn how to perform basic operations in ENOVIA V5

You may also like to read the following complementary product guides, for which the appropriate license is required:

- *Knowledge Expert User's Guide (*containing information necessary to create Expert rules)
- *DMU Space Analysis User's Guide*

Getting the Most out of this Guide

To get the most out of this guide, we suggest you start reading the Getting Started.This section gives you background information on SPE functioning.

Once you have finished, you should move on to the next section: User Tasks dealing with the maincapabilities of DMU Space Engineering Assistant. and software prequisites. It may also be a good idea to take a look at the section describing the menus and toolbars: Workbench Desciption

Conventions Used in this Guide

To learn more about the conventions used in this guide, refer to the *Conventions* section.

Conventions

Certain conventions are used in CATIA, ENOVIA & DELMIA documentation to help you recognize and understand important concepts and specifications.

Graphic Conventions

The three categories of graphic conventions used are as follows:

- Graphic conventions structuring the tasks
- Graphic conventions indicating the configuration required
- Graphic conventions used in the table of contents

Graphic Conventions Structuring the Tasks

Graphic conventions structuring the tasks are denoted as follows:

This icon...	Identifies...
	estimated time to accomplish a task
	a target of a task
	the prerequisites
	the start of the scenario
	a tip
	a warning
	information
	basic concepts
	methodology
	reference information
	information regarding settings, customization, etc.
	the end of a task

 functionalities that are new or enhanced with this release

 allows you to switch back to the full-window viewing mode

Graphic Conventions Indicating the Configuration Required

Graphic conventions indicating the configuration required are denoted as follows:

This icon...	Indicates functions that are...
	specific to the P1 configuration
	specific to the P2 configuration
	specific to the P3 configuration

Graphic Conventions Used in the Table of Contents

Graphic conventions used in the table of contents are denoted as follows:

This icon...	Gives access to...
	Site Map
	Split View mode
	What's New?
	Overview
	Getting Started
	Basic Tasks
	User Tasks or the Advanced Tasks
	Workbench Description
	Customizing
	Reference
	Methodology
	Glossary
	Index

Text Conventions

The following text conventions are used:

- The titles of CATIA, ENOVIA and DELMIA documents *appear in this manner* throughout the text.
- **File** -> **New** identifies the commands to be used.
- Enhancements are identified by a blue-colored background on the text.

How to Use the Mouse

The use of the mouse differs according to the type of action you need to perform.

Use this mouse button...	Whenever you read...
	• Select (menus, commands, geometry in graphics area, ...) • Click (icons, dialog box buttons, tabs, selection of a location in the document window, ...) • Double-click • Shift-click • Ctrl-click • Check (check boxes) • Drag • Drag and drop (icons onto objects, objects onto objects)
	• Drag • Move
	• Right-click (to select contextual menu)

What's New?

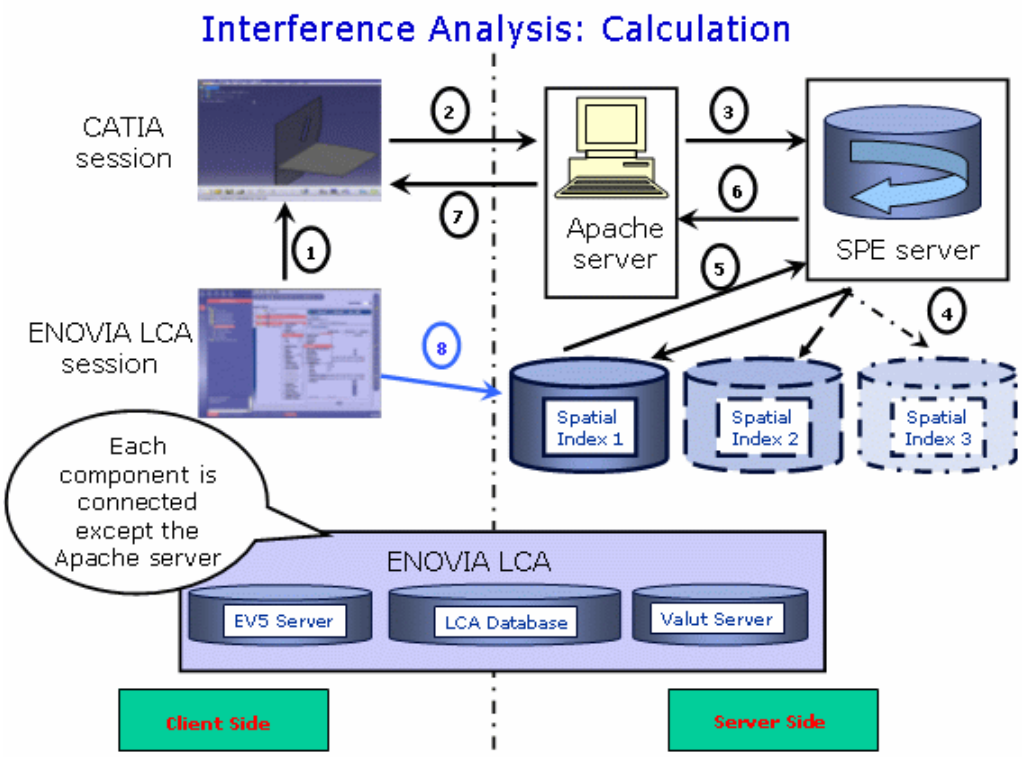
Customizing Settings

Computation Parameters

A new setting lets you specify whether a beep sound should be triggered when the calculation is finished.

Getting Started

The following scheme aims at illustrating what happens when running an interference analysis using Space Engineering Assistant



1 Send your PRC to CATIA using **Send To->CATIA V5** tool

- The connection between CATIA and ENOVIA is established,
- SPE is connected either automatically or manually

2 A calculation is launched using the **Force Computation** icon. A request is automatically sent to the Apache HTTP Server

3 The Apache HTTP Server launches the SPE server (process) .

4 The information is passed to the Spatial index. The Spatial index runs a proximity query and performs other checking operations:

5 The resulting data is sent to the SPE server which performs the clash calculation with respect to the Knowledge clash Rules specified.

6 The result is sent back to CATIA and passes by the Apache HTTP Server.

7 The analysis interference results are available in your CATIA session (using the **Browse Clash Result with committed models** icon in the Spy toolbar) to display the Check clash dialog box

About results and saving operations

You can then modify the status of one detailed clash result, add comments in the DMU Clash dialog box These (modified) clash results will be stored automatically in ENOVIA V5 while saving your session in ENOVIA V5.
In the ENOVIA LCA session, click the Refresh icon and search for the clash result.

- Saving operation in the ENOVIA Data Base is launched
- Clash results computed with Space Engineering Assistant based on Knowledge Clash Rules and created in CATIA are displayed and refreshed in ENOVIA V5 session.

8 To one Product Class Root (ENOVIA document) (referred to as PRC throughout this guide) corresponds one spatial index.

User Tasks

Setting Up Your Session

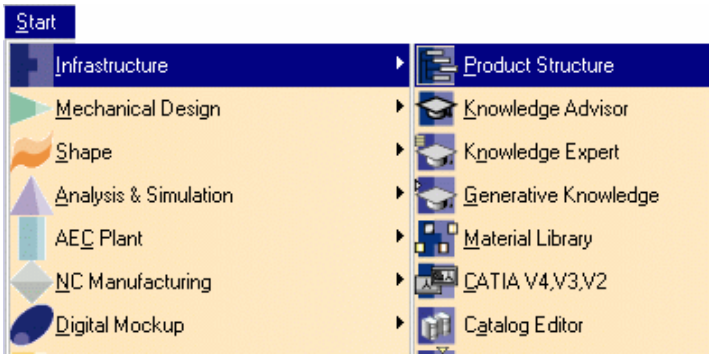
The following task shows you how to prepare your session before launching an interference analysis with Space Engineering Assistant. You will learn how to:

- Display the ENOVIA LCA interoperability toolbar
- Check ENOVIA LCA and DMU Space Engineering Assistant display
- Establish the DMU Space Engineering Assistant/ENOVIA LCA connection
- Customize DMU Space Engineering Assistant Settings
- Send an ENOVIA LCA document into CATIA V5
- initialize connection to DMU Space Engineering Assistant

Have a CATIA and an ENOVIA as well as a Space Engineering sessions running.
We assume in this User's guide that you performed all preliminary installation steps. Read DMU Space Engineering Installation Guide.

How to display the ENOVIA LCA interoperability toolbar?

1. In CATIA V5, select:



The ENOVIA LCA toolbar looks like this:

How to check ENOVIA LCA and DMU Space Engineering Assistant (Spy) toolbars display?

2. Select **View->Toolbars** from the menu bar. Then, make sure Spy and ENOVIA LCA items are selected

How to establish the DMU Space Engineering Assistant/ENOVIA LCA connection?

3. In CATIA V5 (you are in the Product Structure workbench), click the **Connect to LCA** icon  to establish a connection between CATIA V5 and ENOVIA LCA.

   The Enovia toolbar looks like this now:

How to customize DMU Space Engineering Assistant Settings?

4. In CATIA V5, select **Tools->Options->Digital Mock-up** from the menu bar and select **DMU Space Engineering**

The DMU Space Engineering tab lets you customize the following:

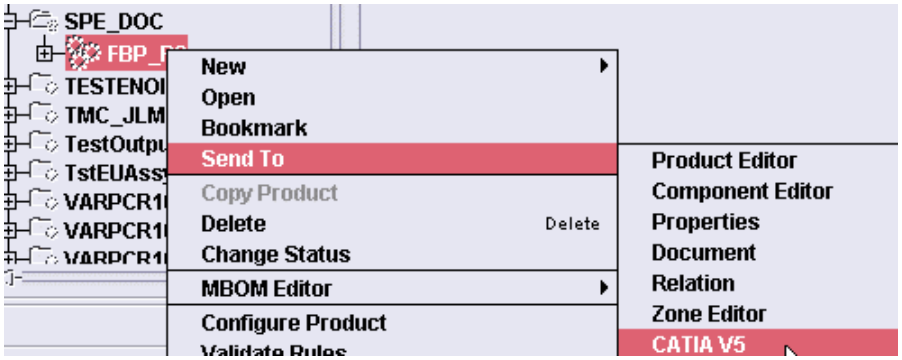
- Connection Mode
- Server Connection Parameters
- Clash Result Path
- Computation Parameters

5. Select **Digital Mockup->DMU Space Analysis** category, to access another option necessary for DMU Space Engineering Assistant
   - DMU Clash - Rule

   For more information, read Customizing section

How to send an ENOVIA LCA document into CATIA V5?

6. Load your Product Class Root (referred to as PRC throughout this guide) from ENOVIA in CATIA V5, using the **Send To->CATIA V5** commands accessible from the contextual menu (all you need to is right-click the desired PRC in the Product Class Editor).



To create a PRC, refer to the appropriate ENOVIA LCA documentation (*Engineering LifeCycle User's guide*)

How to initialize connection to DMU Space Engineering Assistant?

6. In CATIA V5, click the Connect/Disconnect icon from the DMU Space Engineering toolbar:

The icon becomes active , the connection is established for the product loaded in your CATIA session.
You are now ready to work with DMU Space Engineering Assistant
- Modify the existing parts
- Create new parts...

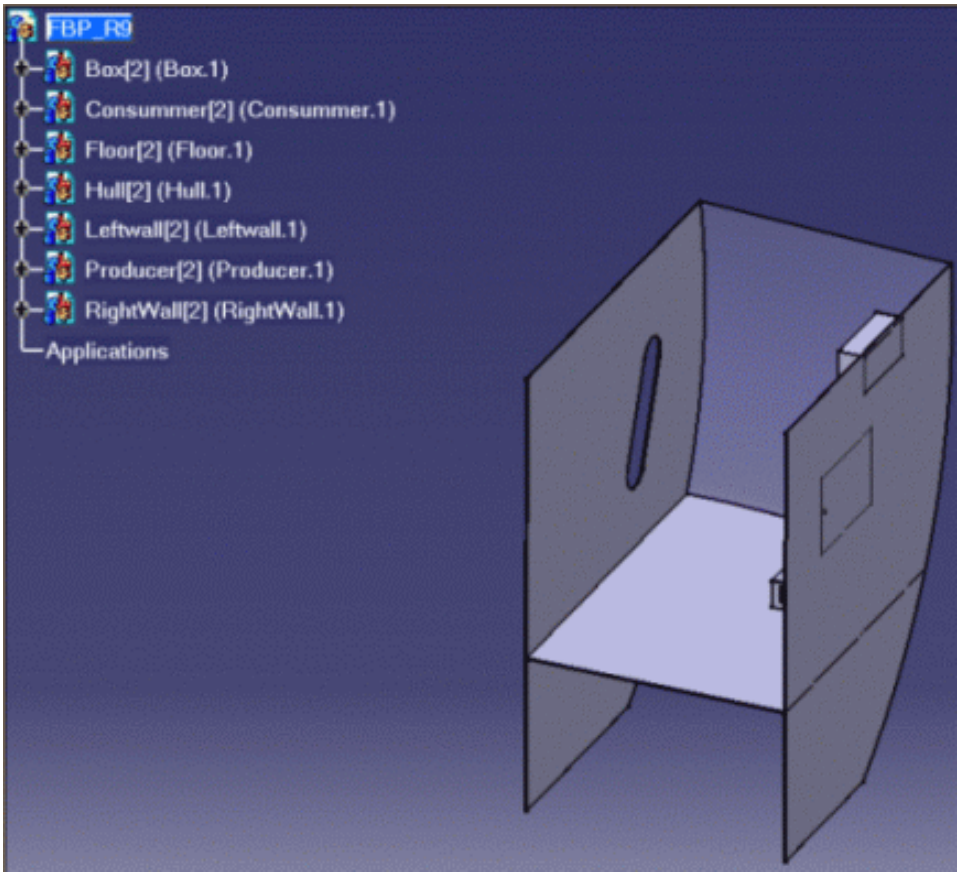
Each time, you need to run an interference analysis, click the icon to force the calculation: each and every part modified since last computation is sent to DMU Space Engineering server. An hourglass appears on the icon when the calculation is launched

Running an Interference Analysis

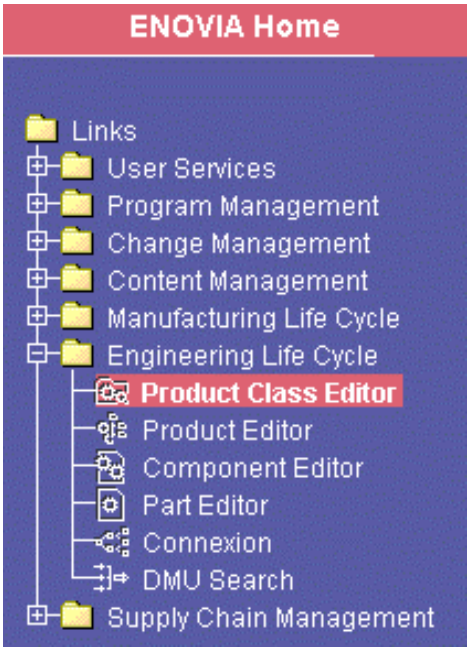
The following task shows you how to search clashes with Space Engineering Assistant

Have a CATIA and an ENOVIA sessions running

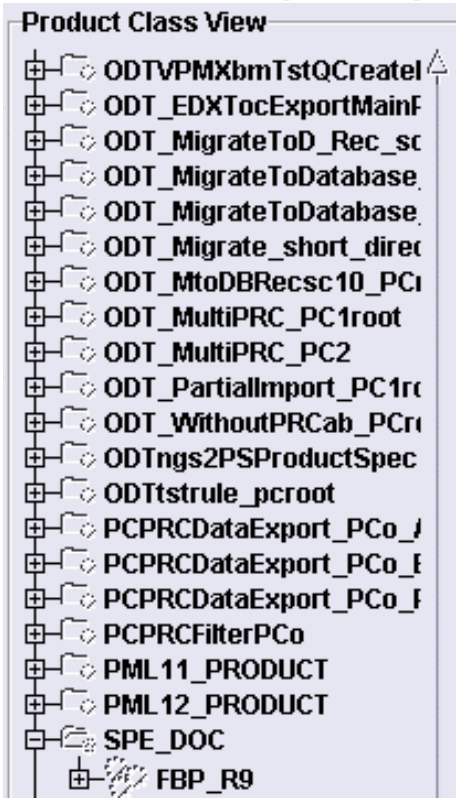
You created a PRC in ENOVIA with the following instances



1. In CATIA, click the **Init Enovia V5 Connection...** icon to establish a connection between CATIA V5 and ENOVIA LCA. (this step is not necessary if the connection was automatically established)
2. In the ENOVIA Homepage panel, select the **Engineering Life Cycle** folder and double-click the **Product Class Editor** bookmark:



The Product Class View panel is displayed



3. Select an existing Product Class Root (PRC) in our example FBP_R9

4. Right-click the PRC (FBP_R9) and select **Send To -> CATIA V5** from the contextual menu displayed

   The document is loaded in CATIA V5 but the instances are not.

5. In CATIA V5, click the **Connect/Disconnect** icon  from the **DMU Space Engineering** toolbar: The icon

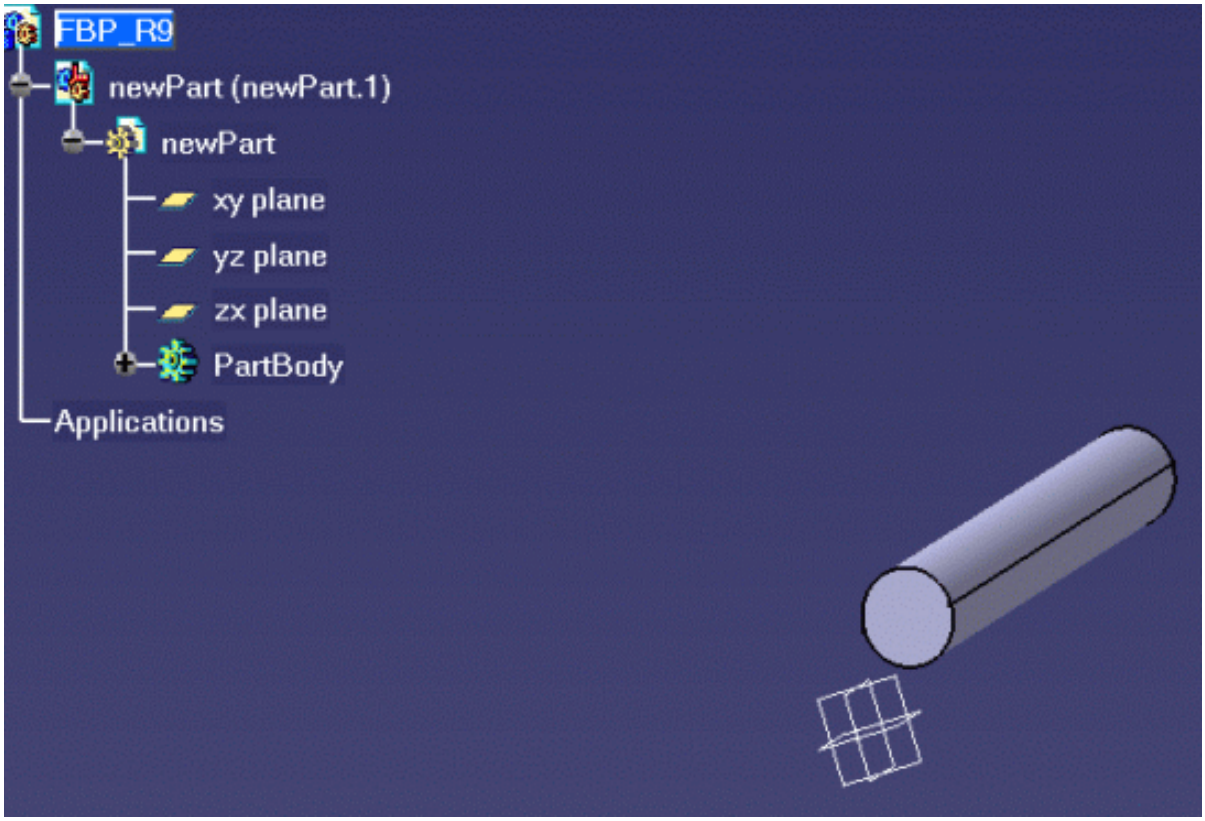
changes in this: 

6. Create a .CATPart document in your PRC.

   For this:

   - select the **New Part** icon  in Product Structure workbench
   - select a reference plane
   - swap to the Sketcher workbench

   Please refer to:
   - *Part Design User's Guide* to obtain detailed information on how to create CATPart documents
   - Inserting a New Part in the *Product Structure User's Guide*



Double-click the PRC in the specification tree to swap to Product Structure workbench if necessary

7. Click the **Force Computation**  icon the DMU Space Engineering toolbar to launch the calculation.

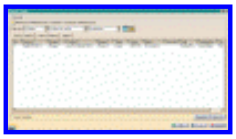
What happens?

The new created part is sent to DMU Space Engineering server. Space Engineering Assistant server launches a proximity query searching for clashes (to detect how this new part impacts the existing PRC instances)

An hourglass appears on the connection icon showing the calculation is in progress 

8. Click the **Browse Clash Result with committed models** icon  . The **Check Clash** dialog box is displayed.

   Click on the image below:



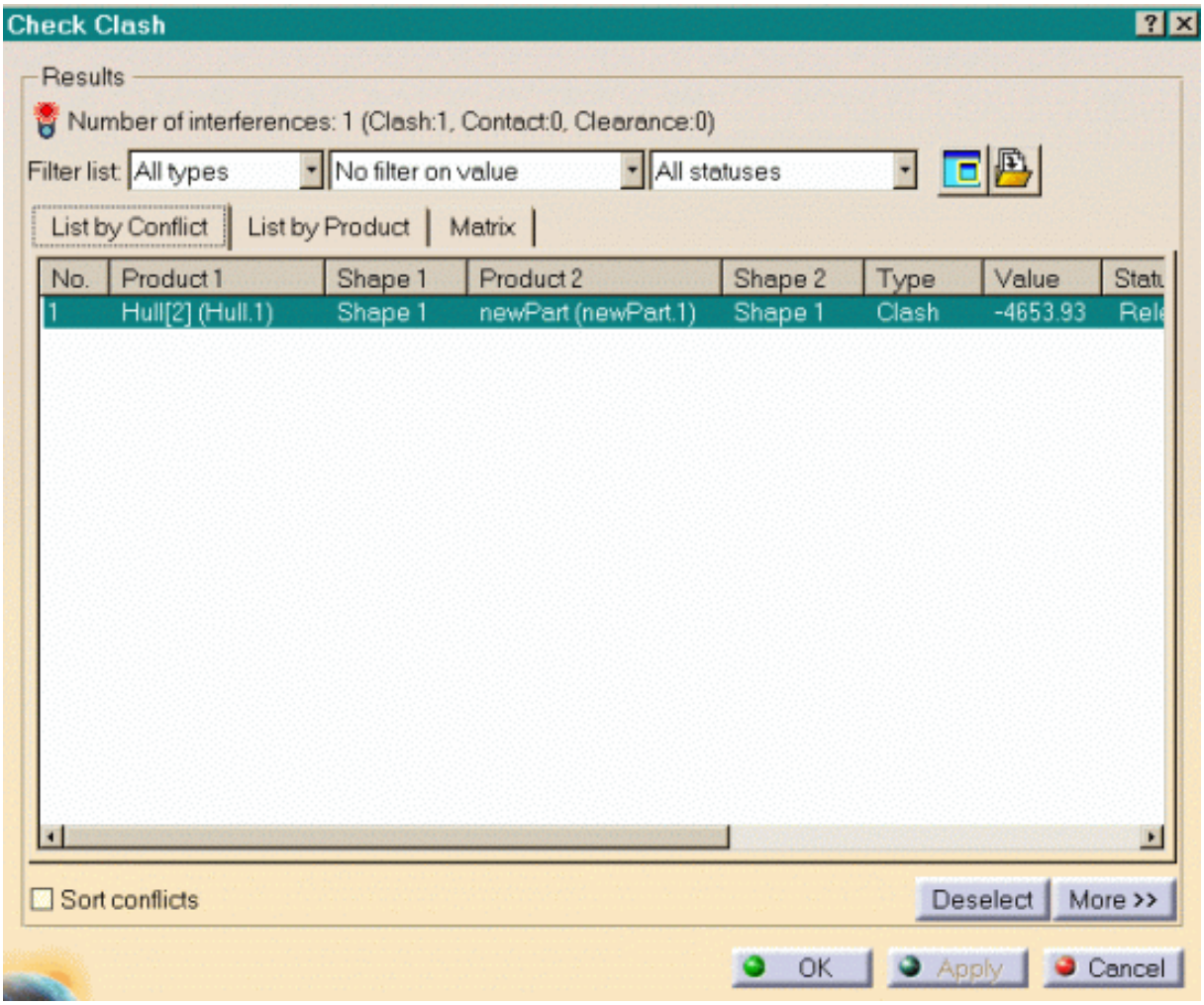
The dialog box identifies the number of interferences detected along with the type: one interference has been detected (generated by the new part creation)

Status lights  are color-coded:

- red: at list one conflict is relevant
- orange: no relevant conflicts, at least one conflict is Not inspected
- green: all conflicts are irrelevant

Note: The 'List by product' and 'Matrix' tabs are deactivated when working with DMU Space Engineering Assistant.

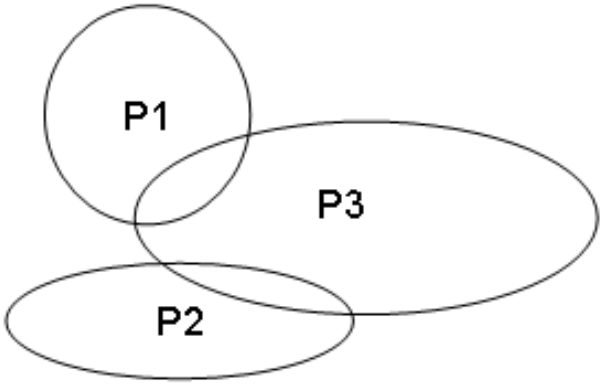
9. Select the clash of interest in the results list. By default, results are organized by conflict in the List by Conflict tab.



10. (Optional) Select the **Sort conflicts** checkbox to display the conflicts associated with each and every product.

There may be more than one conflict per product. Let's take a simple example.

You run an interference analysis on the three products (P1, P2, P3) below:



Two interferences are displayed by default: (between: P1 P3 and P2 P3)

Sort conflicts checkbox not selected

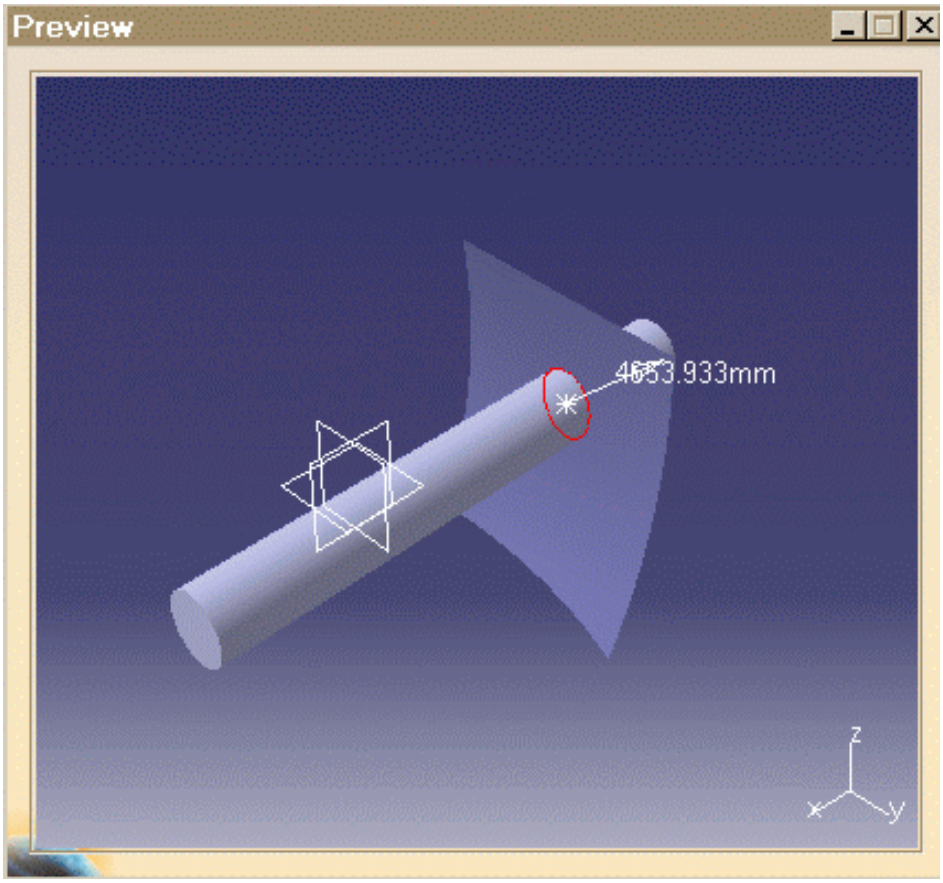
Product 1	Shape1	Product 2	Shape 2
P1	Shape1	P3	Shape1
P2	Shape1	P3	Shape1

Now, if you want to display the conflicts associated with each product (combinations: P1 P3, P3 P1, P3 P2 and P2 P3) select the **Sort conflicts** checkbox:

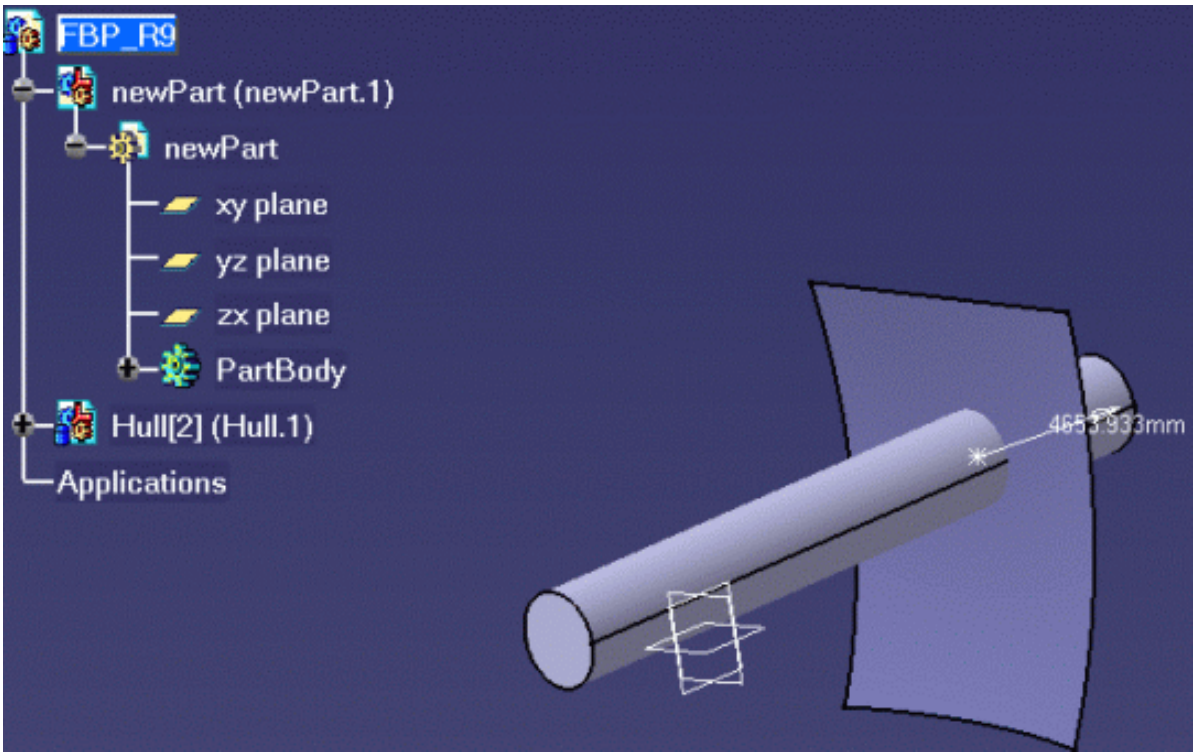
Sort conflicts checkbox selected

Product 1	Shape 1	Product 2	Shape 2
P1	Shape1	P3	Shape1
P3	Shape1	P1	Shape1
P3	Shape1	P2	Shape1
P2	Shape1	P3	Shape1

The preview window is displayed.



The parts in clash are automatically loaded in CATIA V5. In our example, only the Hull .CATPart document is loaded.



11. Click the **Save Data in ENOVIA V5 Server** icon  to save the data in ENOVIA LCA.

What happens?

This operation launches a last clash computation to check the clash result is still relevant (i.e. other users can have performed modifications impacting the PRC).
The **Save in ENOVIA V5** dialog box opens:

12. Click **Ok** to perform the operation.

13. Check the clash results are saved in ENOVIA. Please refer to "Searching Clashes by Item Instance Selection" in *Product Interference Management User's Guide*.

 Do not forget to a save in ENOVIA for this, in Product Class Editor, click  .

14. Close your PRC in CATIA (in our example FBP_R9).

15. Now, reopen your PRC in CATIA: right-click the PRC (FBP_R9) and select **Send To -> CATIA V5** from the contextual menu displayed.

16. Select the Hull Product to search for interferences.

17. Click the **Browse Clash result involving a selected product** icon  . The **Check Clash** dialog box appears displaying all the related clashes previously stored.

About Browse Clash result involving a selected product capability

This command lets you search for interferences related to one (or more) selected product (s)
The **Check** dialog box only displays the interference results related to the selected product (s)

How does it work?

This filtered list is the result of a comparison between the currently stored interferences in database and the interferences detected in your current working session. When exiting the command, a reset action is performed on the filtered list. Next time, you review your interference results using the  icon, the list will be complete (the clashes related to the entire session will be displayed).

Workbench Description

DMU Space Engineering Toolbar

This section contains the description of the toolbar icons which are specific to the DMU Space Engineering Assistant
The DMU Space Engineering Assistant toolbar looks like this:

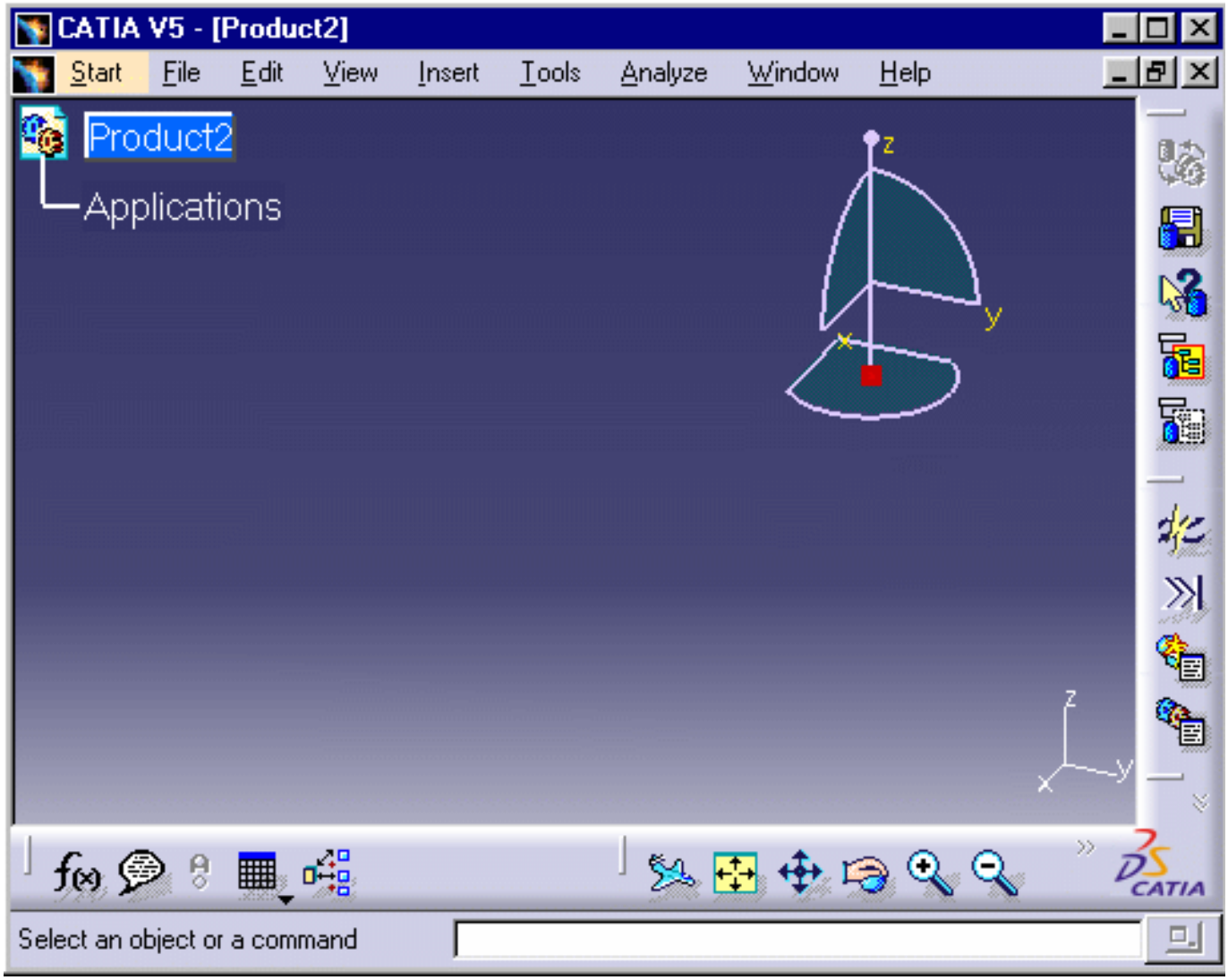
Icon	Name	Select this icon to...
	Connect/Disconnect	initialize (or interrupt) the connection to DMU Space Engineering server the icon automatically swaps to:
	Connection initialized	
		the hourglass appearing on the connection icon shows the calculation is in progress
	Force Computation	send each and every part modified to DMU Space Engineering server since last computation . Please refer to Running an Interference Analysis
	Browse Clash Result with committed models	display the clash results calculated by the Space Engineering Assistant in your CATIA session
	Browse Clash result involving a selected product	• add the existing clash results stored in ENOVIA to the DMU Space Engineering Assistant clash results list • display the DMU Space Engineering Assistant clash results list in your CATIA session.

Note: All you need to do is select the clash of interest in the Check Clash dialog box list to display the parts involved in the clash.

ENOVIA LCA and CATIA V5 Interfaces

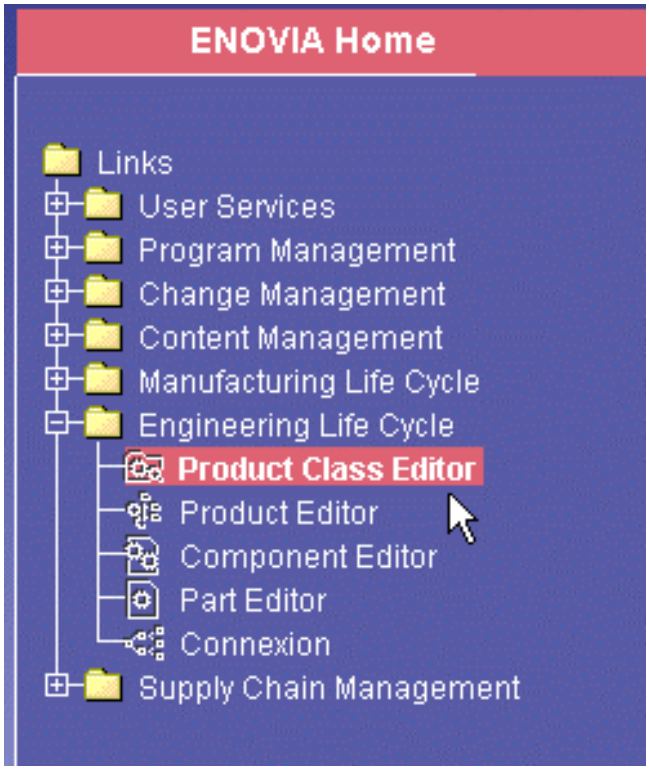
CATIA V5 Product Structure Interface:

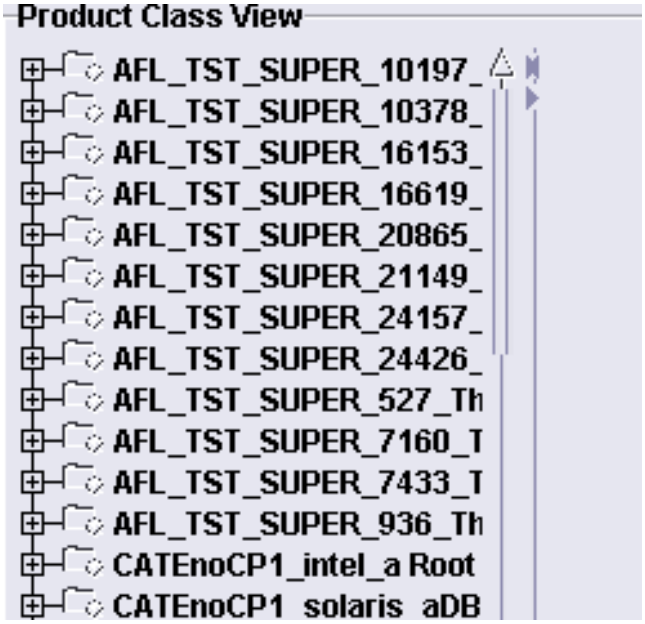
looks like this, click the toolbar on the right to display the related information



Product Class Editor Interface:

You can access the Product Editor interface from ENOVIA V5 by clicking Life Cycle folder and selecting the **Product Class Editor** bookmark


ENOVIA Home
Links
User Services
Program Management
Change Management
Content Management
Manufacturing Life Cycle
Engineering Life Cycle
Product Class Editor
Product Editor
Component Editor
Part Editor
Connexion
Supply Chain Management


Product Class View
AFL_TST_SUPER_10197_
AFL_TST_SUPER_10378_
AFL_TST_SUPER_16153_
AFL_TST_SUPER_16619_
AFL_TST_SUPER_20865_
AFL_TST_SUPER_21149_
AFL_TST_SUPER_24157_
AFL_TST_SUPER_24426_
AFL_TST_SUPER_527_Th
AFL_TST_SUPER_7160_T
AFL_TST_SUPER_7433_T
AFL_TST_SUPER_936_Th
CATEnoCP1_intel_a Root
CATEnoCP1_solaris_aDB

ENOVIA LCA Toolbars

ENOVIA LCA Interoperability Toolbar
Product Class Editor Toolbar

ENOVIA LCA Interoperability Toolbar

The commands dedicated to ENOVIA LCA interoperability can be accessed through the ENOVIA LCA toolbar displayed in CATIA V5 Product Structure interface.

The toolbar looks like this:

Icon	Name	Select this icon to...
	Init Enovia V5	establish a backbone communication between CATIA and ENOVIA editor
	Save Data in ENOVIA V5 Server	save the modifications in ENOVIA LCA server without committing data
	Identify in ENOVIA V5	identify the selected objects in ENOVIA V5 editor
	Load children From ENOVIA LCA	directly loads from ENOVIA LCA the children products of the selected instances
	Unload Branch From CATIA LCA	unloads the selected branche(s) of an ENOVIA imported product

Product Class Editor Toolbar

The Product Class Editor offers a series of basic functions that you use to maintain and revise product class structures.

These functions include the ability to delete specific nodes of the product class structure, copy and paste configurable views, to save changes, to reorder the view of the product class structure by ascending sort, etc.

- Horizontal toolbar
- Vertical Toolbar

Horizontal Toolbar

Icon	Name	Select this icon to...
	New Root	create a new product root
	Open	open in Product Editor
	Save	save changes you have made to the product class structure
	Refresh	refresh the view of the product class structure
	Close	close the current Product Editor
	Help	access Help information

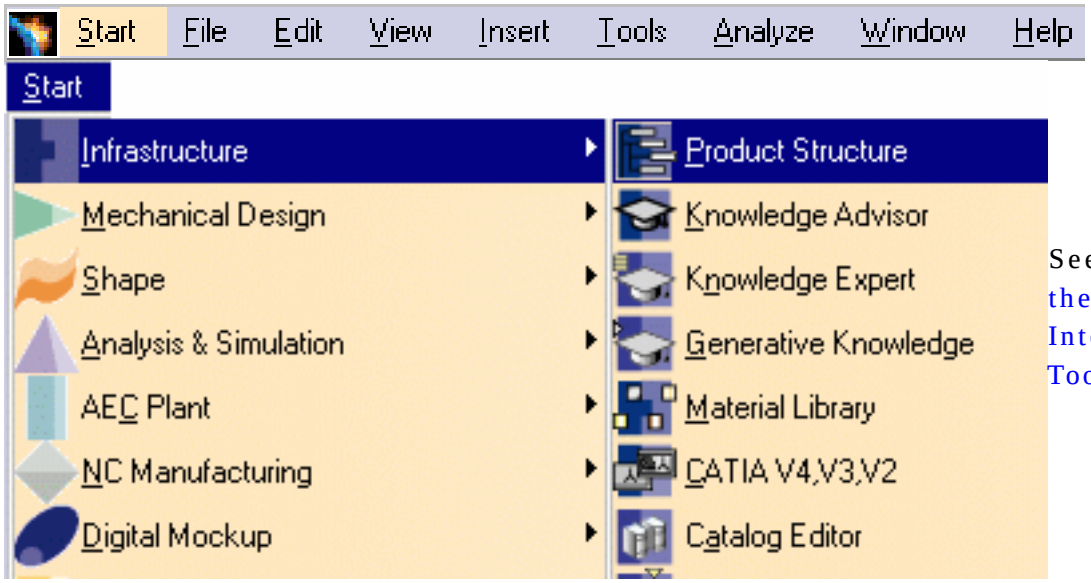
Vertical Toolbar

Icon	Name	Select this icon to...
	Ascending Sort	reorder the view of the product class structure
	Start Category Editor	open the Category Editor dialog box
	Start Rules Editor	open the Rules Editor dialog box

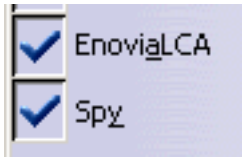
ENOVIA LCA and CATIA V5 Menus

CATIA V5 Menu Bar

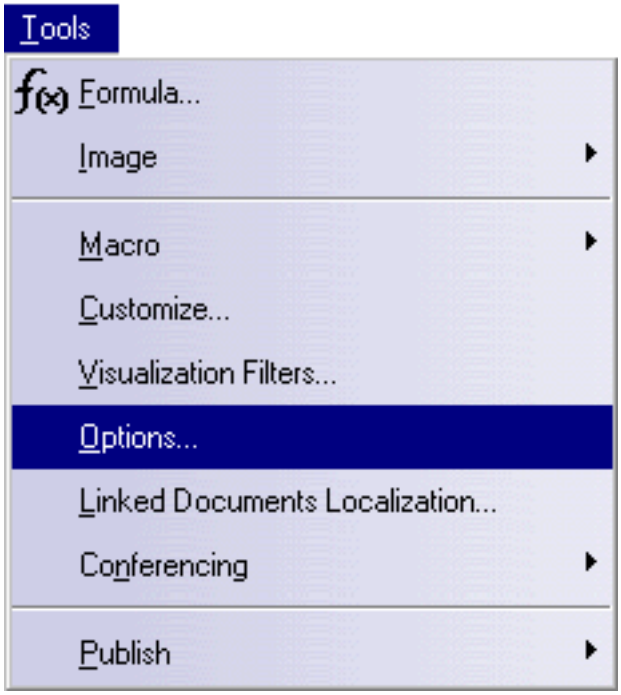
This section presents the menu bar tools and commands dedicated to Space Engineering Assistant



See How to display the ENOVIA V5 Interoperability Toolbar



See How to check ENOVIA V5 and DMU Space Engineering Assistant (Spy) toolbars display

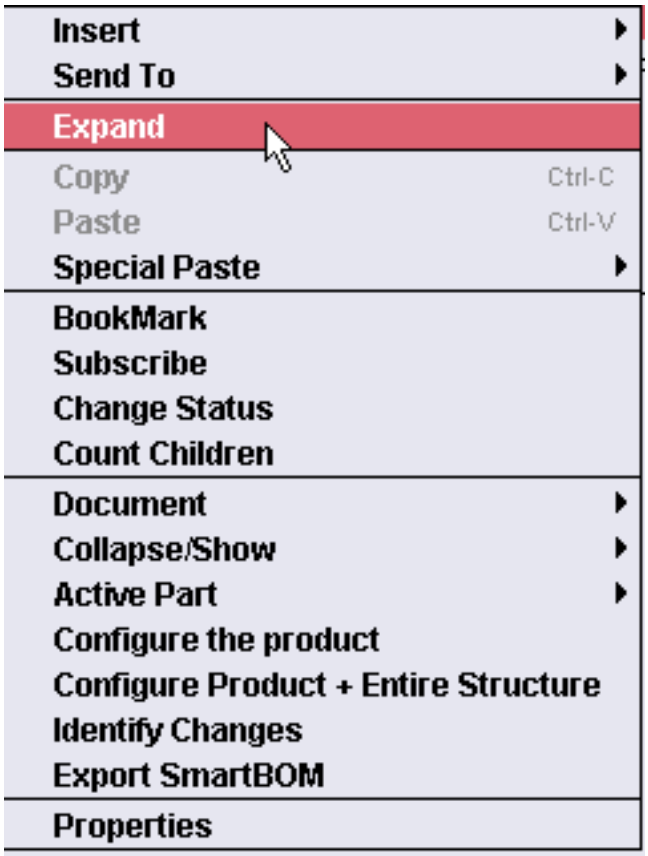


See Customizing DMU Space Engineering Assistant Settings

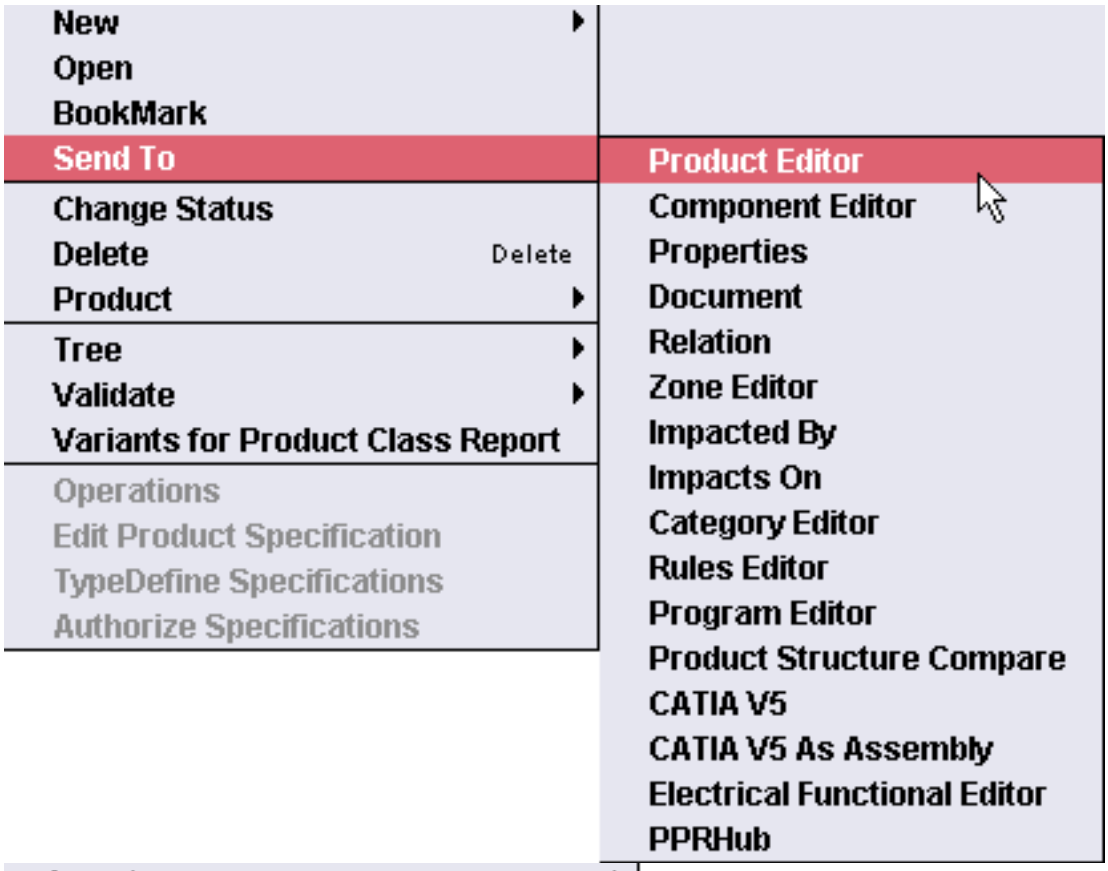
ENOVIA LCA Shortcut Menus

You access the following shortcut menus when you right-click a product, either in the Product Class View or the Product Class Editor Panel

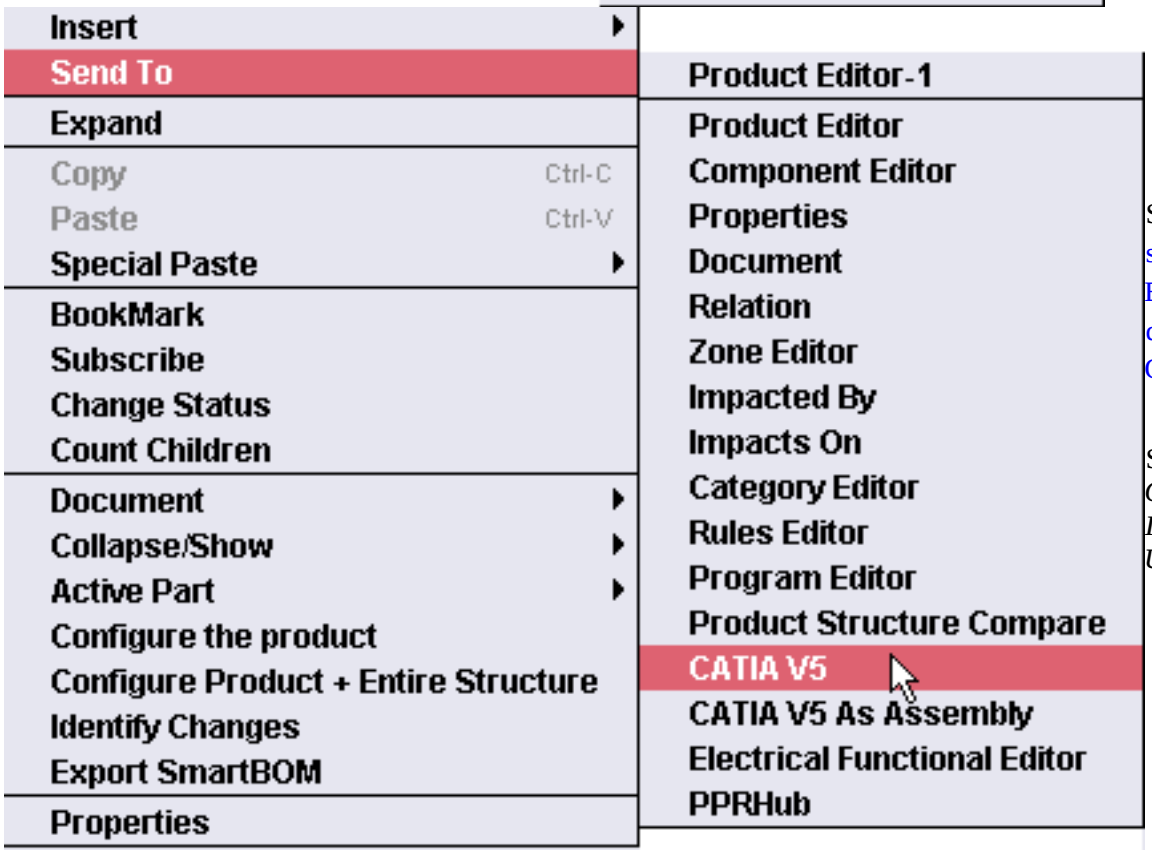
The shortcut menus displayed below may differ depending on the panel from which it was selected.



See *ENOVIA CATIA Interoperability User's Guide*



See *ENOVIA CATIA Interoperability User's Guide*



See How to send an ENOVIA V5 document into CATIA V5

See *ENOVIA CATIA Interoperability User's Guide*

Customizing

Before you start your first session, you can customize the way you work to suit your habits. This type of customization is stored in permanent setting files: these settings will not be lost if you end your session.

To access them, proceed as follows:

1. Select the **Tools -> Options** command.

   The **Options** dialog box appears.

2. Select the **Digital Mockup** category in the left-hand box. Various tabs appear.

3. Click **DMU Space Engineering** tab.

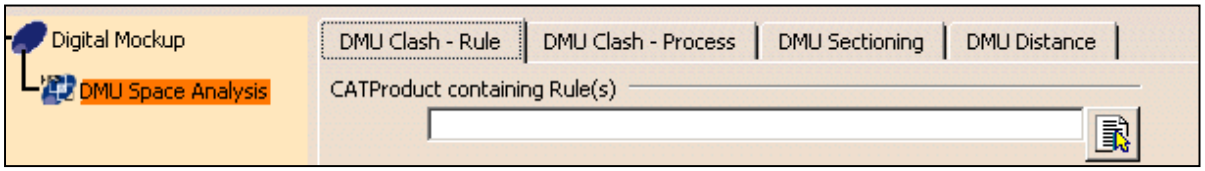
   The **DMU Space Engineering** tab page is displayed.

   The DMU Space Engineering tab lets you customize options dealing with:

   - Connection Mode
   - Server Connection Parameters
   - Clash Result Path
   - Computation Parameters

4. Another tab, located in **Digital Mockup->DMU Space Analysis** category, is also needed for DMU Space Engineering Assistant.

   - DMU Clash - Rule lets you identify the path to the CATProduct containing knowledgeware clash rules.

   Client workstations and servers must point to the same rule-based clash.

5. Set options in this tab according to your needs.

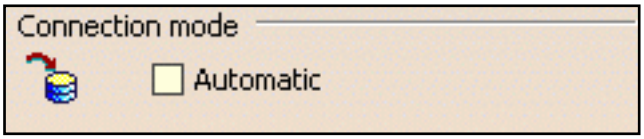
6. Click **Ok** in the **Options** dialog box when done

DMU Space Engineering

This page deals with the following options:

- Connection Mode
- Server Connection Parameters
- Clash Result Path
- Computation Parameters

Connection Mode



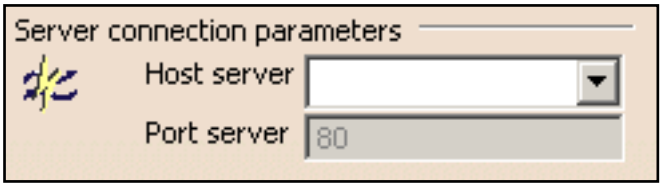
Automatic

Select the **Automatic** check box to connect DMU space Engineering Assistant automatically to the http server, you do not need to click the Connect/Disconnect icon  .
(The connection is established during the Send to CATIA... operation)

If disabled (default mode), you need to connect manually to the server clicking the **Connect/Disconnect** icon in the Spy toolbar.

By default, the Automatic check box is cleared.

Server Connections Parameters



Host Server

Specify the host server name (name of the machine hosting the Apache server) using the drop-down list.

By default, this field is left blank.

Port Server

Specify the port server name.

By default, this field is grayed out.

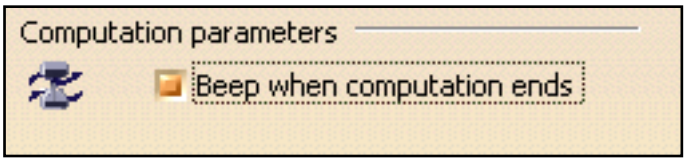
Clash Result Path

Path

Click **Browse** and specify the path directory where the XML files (clash results) are to be stored.

By default, this field is left blank.

Computation Parameters

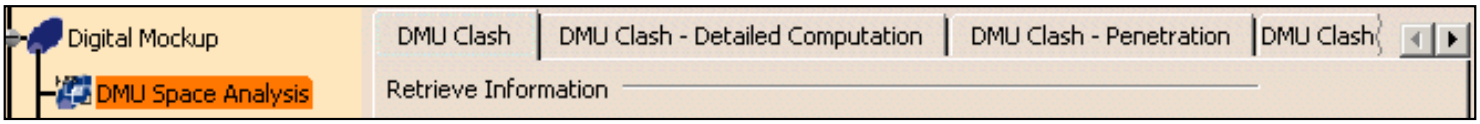


Beep when computation ends

Clear this check box if you want to deactivate the beep sound which is triggered when the calculation is finished.

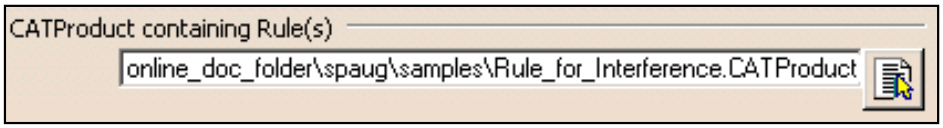
By default, this check box is selected.

DMU Clash - Rule



The DMU Clash - Rule tab contains only one category of options: CATProduct containing Rule(s).

CATProduct containing Rule(s)



Enter the full path to the CATProduct containing knowledgeware clash rules, or select this path using the icon.

By default, this field is left blank.

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