

Weight & Balance for ENOVIA V5 (WC9)

BPA Delivery 7 for V5R19 (V5.6)

User Guide

V5R19



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Introduction

This document describes the user guide for the Weight & Balance for ENOVIA V5 (WC9) Business Process Accelerator.

This manual aims at providing the users information on how to use Weight & Balance for ENOVIA V5.

Related Documentation

- WC9_InstallationGuide
- WC9_ImplementationGuide

Prerequisite for Weight and Balance for ENOVIA V5

ENOVIA V5 platform is the main prerequisite for WC9 on the server side.
The integration of a DMC supporting the Weight & Balance required attributes is also a prerequisite.
A functional installation of ENOVIA VPM Navigator on the client side is also a prerequisite.

Information

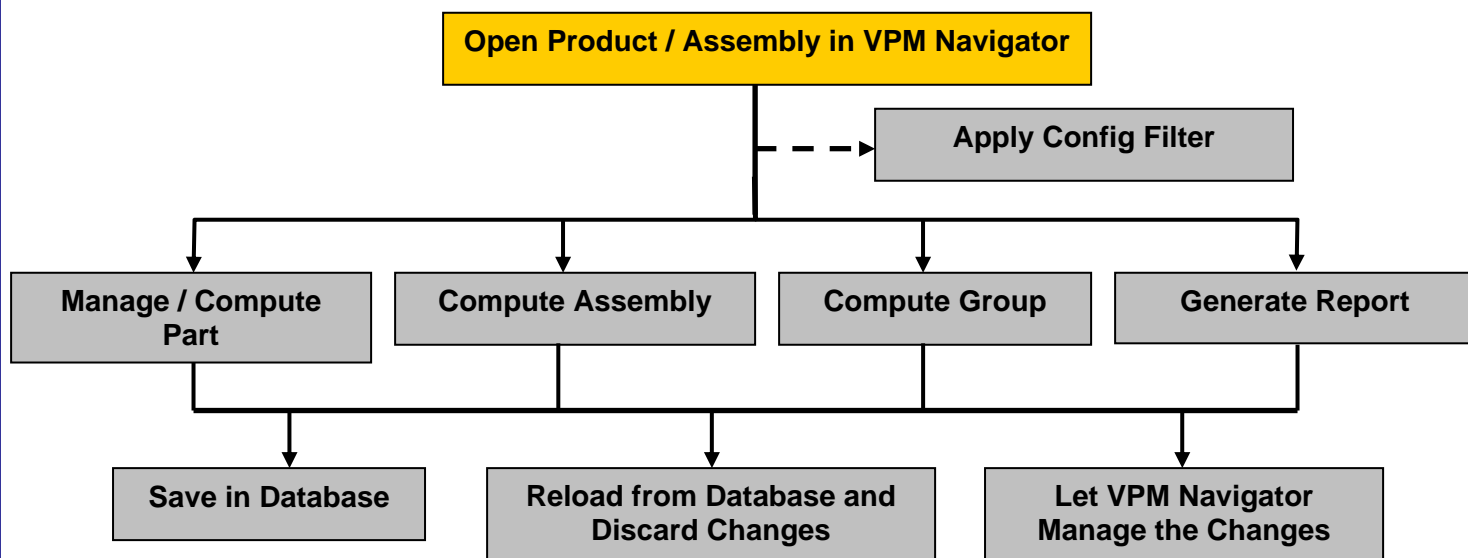
The required ENOVIA V5 is R19SP4
The required CATIA V5 and ENOVIA VPM V5 is R19SP4

Weight & Balance for ENOVIA V5

The Weight & Balance product for ENOVIA VPM Navigator is composed of a toolbar available in the VPM Navigator workbench, a batch program available on the server side and the settings editor interface to be launched by the administrator on the server side.

Process Flow

The flow chart below illustrates how the W&B product interfaces itself with VPM Navigator.



Launching Weight & Balance

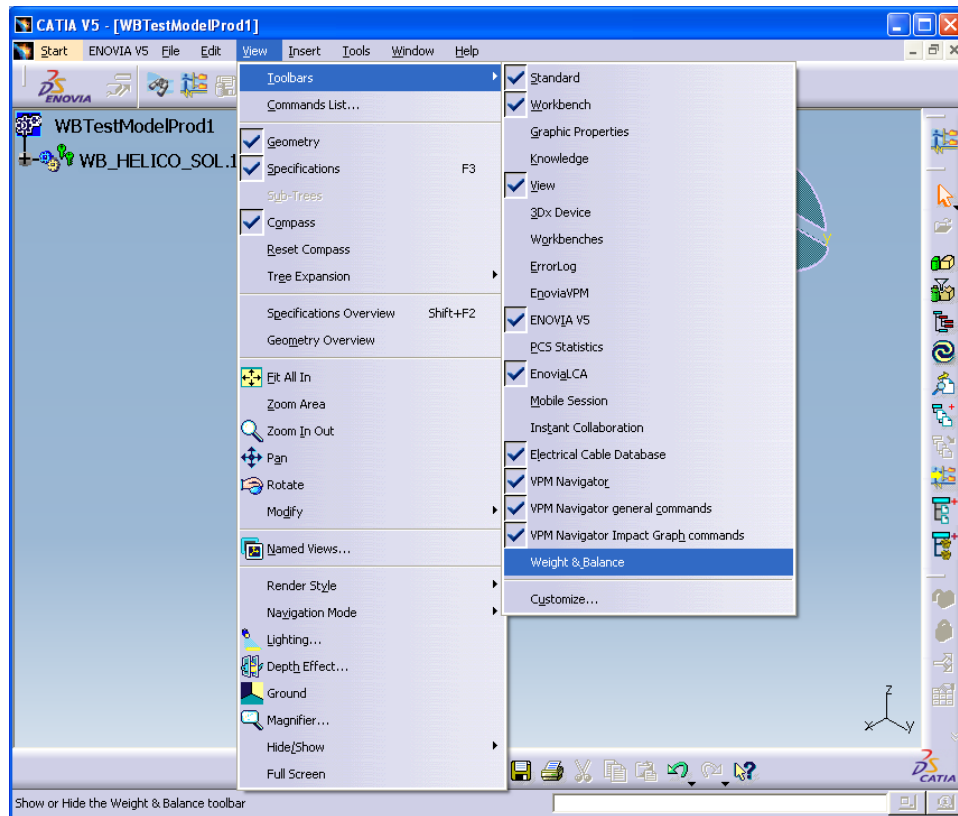
From VPM Navigator

The toolbar is available in every workbench but commands will only respond in a VPM Navigator context. Make sure the Weight & Balance toolbar is available by clicking on:
Views / Toolbars / Weight & Balance



Connection to ENOVIA Database

W&B is an application integrated in ENOVIA VPM Navigator. The toolbar containing the 5 W&B commands is called "Weight & Balance". If the toolbar is not available, click on "View / Toolbars / Weight & Balance".



The toolbar should appear like this:



To be able to use the commands, a connection to the ENOVIA database needs to be established. Once the connection is done, open a VPM Navigator window to access PRCs stored in the ENOVIA database.

Save assemblies in ENOVIA

If an assembly is saved from CATIA to ENOVIA, make sure that the attribute mapping is activated, otherwise, a standard assembly with no W&B metadata will be created in the ENOVIA database.

Click on "Tools / Options / General / Compatibility / ENOVIA V5"

Make sure the check box "Work with Attribute Mapping" is checked and a valid XML file is loaded.

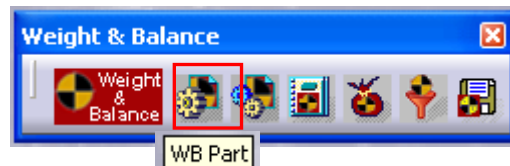
Example of XML file:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE MappingDescription SYSTEM "C:\Program Files\Dassault
Systemes\B18\intel_a\code\dictionary\AttributesMapping.dtd">
<MappingDescription>
  <DomainDef EntityType="Part" DefinitionType="FixedValue" Name="WBProduct"/>
  <DomainDef EntityType="Document" DefinitionType="FixedValue" Name="WBDoc"/>
  <AttributesMapping EntityType="Part" DomainName="WBProduct">
    <Attribute Name="Revision" Type="STRING">
      <CATIAInfo Name="Revision" Editable="No" Visible="Yes" />
      <DBInfo Name="V_version" LCASubEntity="PV" Editable="Yes" Visible="Yes"
    />
    </Attribute>
  </AttributesMapping>
  <AttributesMapping EntityType="Document" DomainName="WBDoc">
    <Attribute Name="Revision" Type="STRING">
      <CATIAInfo Name="Revision" Editable="No" Visible="Yes" />
      <DBInfo Name="V_version" LCASubEntity="DV" Editable="Yes" Visible="Yes"
    />
    </Attribute>
  </AttributesMapping>
</MappingDescription>
```

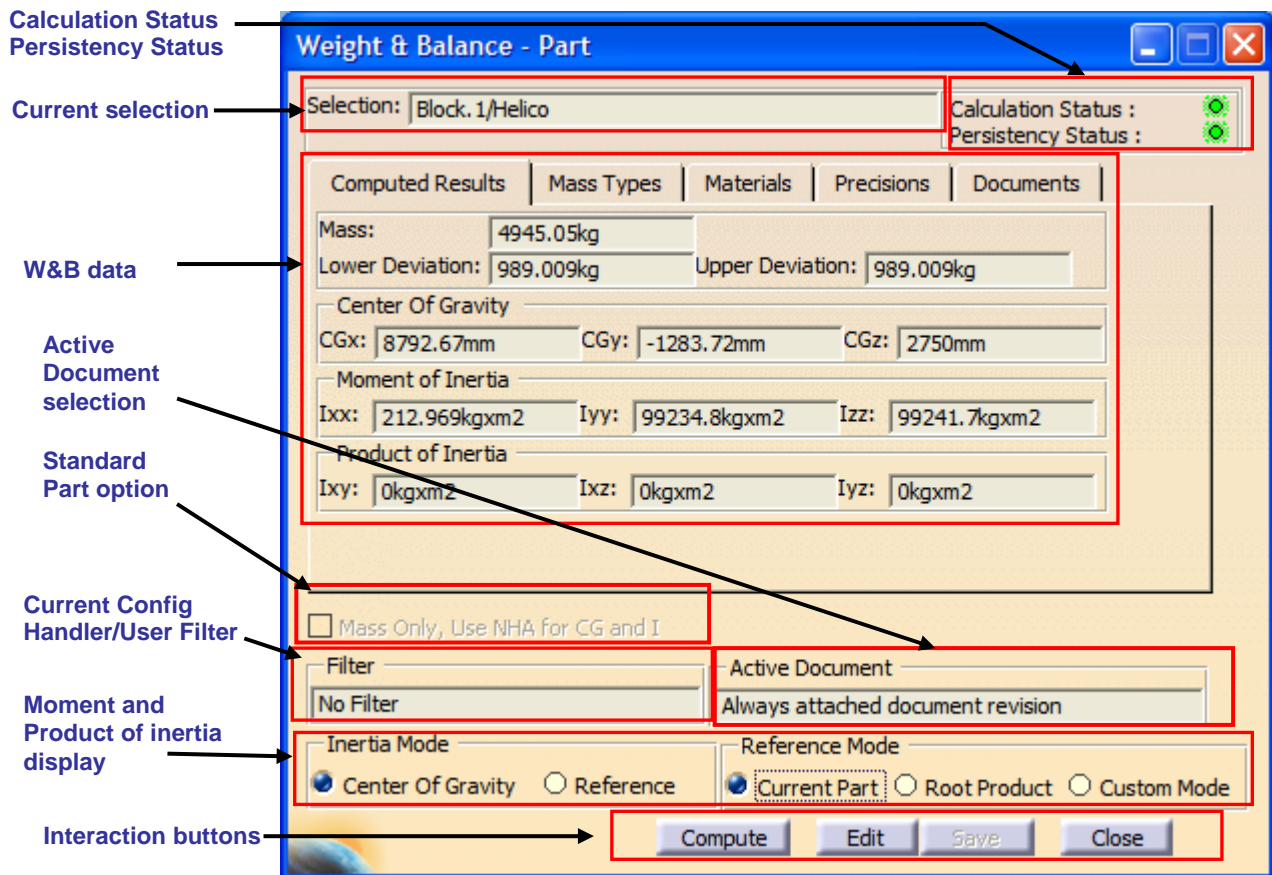
The Weight & Balance Toolbar

The WB Part Command

The purpose of this interface is to offer tools to analyze the product's mass properties at each assembly level. To display the W&B panel, a part needs to be selected in the VPM Navigator graph window.

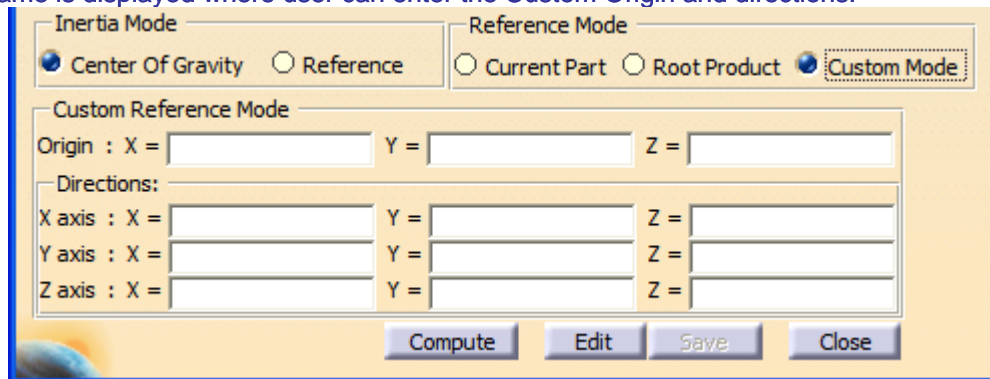


If it is the first time that W&B is launched on a part, the panel should look like the one below

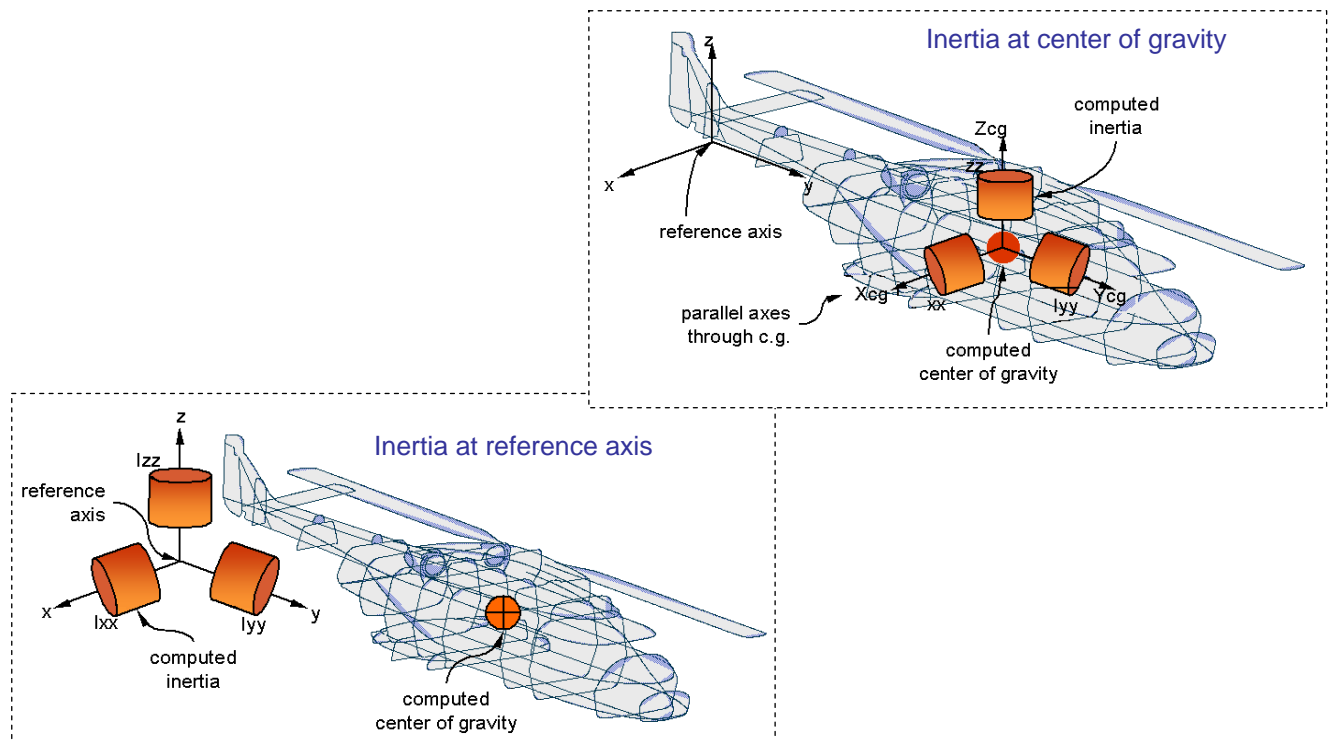


1. **Calculation Status:** show the user that the last calculation date is lesser than the date of the last modification on the part. These modifications may have an impact on the W&B computed results.
2. **Persistency Status:** show the user that the modifications on the part will not be stored by default by VPM Navigator. However, the changes can still be made persistent with the WB Save Command.
3. **Current selection:** the name of the part that has been selected.
4. **W&B Data:** this frame displays the W&B data.

5. **Moment and Product of inertia display:** Radio button to display the inertia matrix with the part center of gravity or its center as reference.
6. **Standard Part option:** Defines and displays whether the currently selected part is a Standard Part or not.
7. **Current Config Handler/User Filter:** Displays the name of the currently selected config handler. If VPM Nav Filters are selected, displays "User Filter"
8. **Reference Mode:** Defines the reference mode for computation. If Custom Mode is selected, a custom reference frame is displayed where user can enter the Custom Origin and directions.



The distinction of using either **Center of Gravity** or **Reference Axis** is illustrated hereunder.



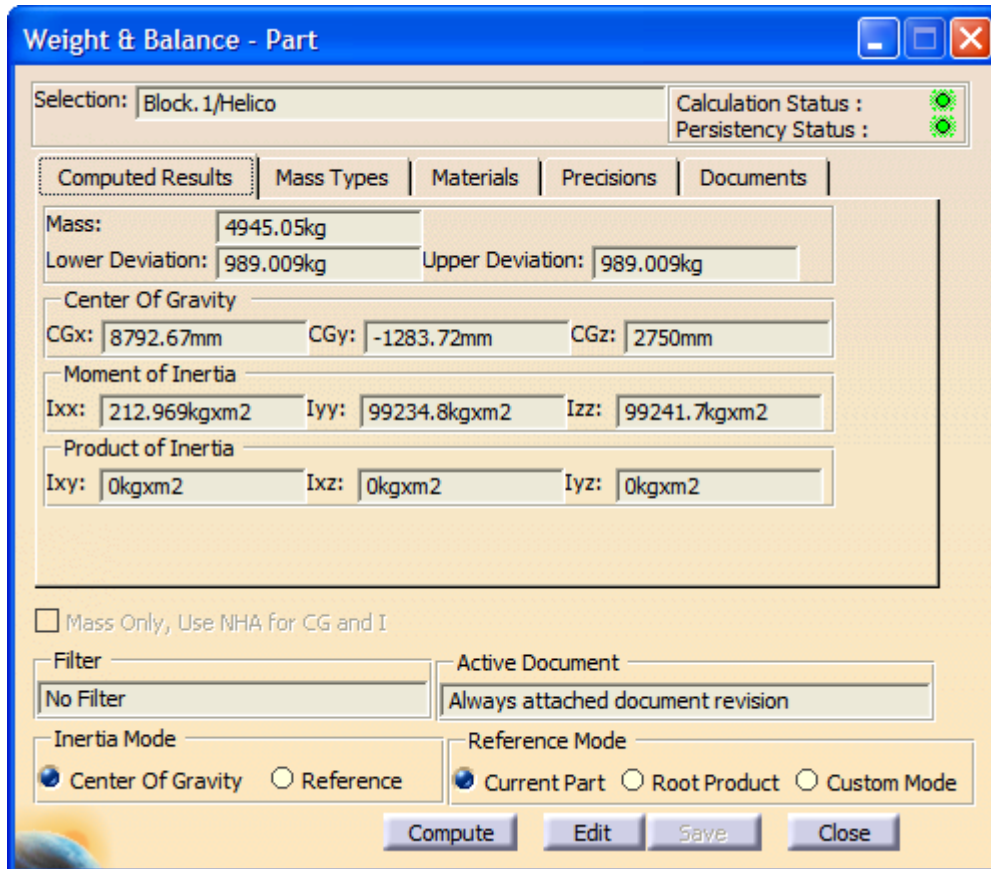
5. **Interaction buttons:** delete, compute, edit and save W&B data. The close button closes the window.

The panel has 4 tabs that display W&B data

1. Result tab
2. Mass Type tab
3. Material tab
4. Precision tab

Result tab

This tab displays the computed data only.



The screenshot shows the 'Weight & Balance - Part' dialog box with the 'Result' tab selected. The 'Selection' field contains 'Block. 1/Helico'. The 'Calculation Status' and 'Persistency Status' are both green, indicating successful calculations. The 'Computed Results' section displays the following data:

Mass	Lower Deviation	Upper Deviation
4945.05kg	989.009kg	989.009kg

The 'Center Of Gravity' section displays the following data:

CGx	CGy	CGz
8792.67mm	-1283.72mm	2750mm

The 'Moment of Inertia' section displays the following data:

Ixx	Iyy	Izz
212.969kgxm2	99234.8kgxm2	99241.7kgxm2

The 'Product of Inertia' section displays the following data:

Ixy	Ixz	Iyz
0kgxm2	0kgxm2	0kgxm2

Below the data fields, there is a checkbox for 'Mass Only, Use NHA for CG and I'. The 'Filter' dropdown is set to 'No Filter'. The 'Active Document' dropdown is set to 'Always attached document revision'. The 'Inertia Mode' section has 'Center Of Gravity' selected. The 'Reference Mode' section has 'Current Part' selected. At the bottom, there are buttons for 'Compute', 'Edit', 'Save', and 'Close'.

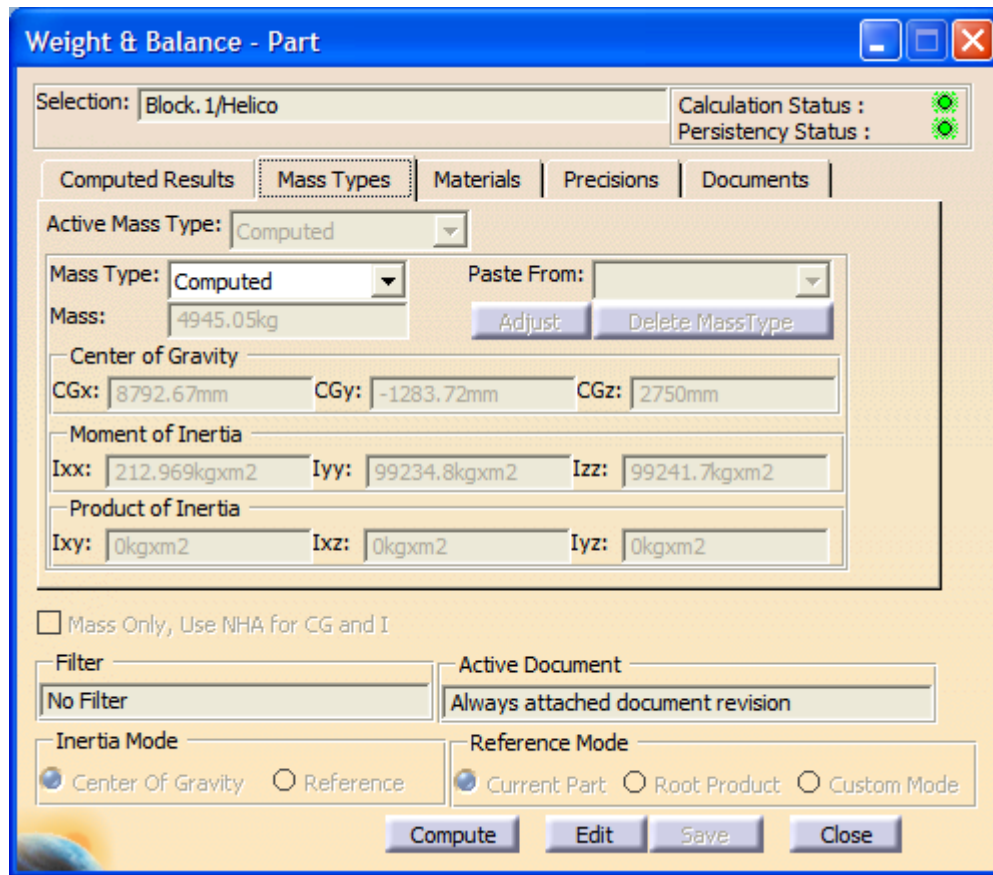
This tab is updated when the “Compute” button has been hit.

If the Calculation status is green, it means that the data displayed are up to date with the last modification performed on the part, no need to hit the “Compute” button again.



Inertia Mode and Reference Mode are available only on this tab. For rest of the tabs, they are disabled and reset to Center Of Gravity and Current Part options respectively.

Mass Type tab

This tab displays W&B data according to available mass types in the administrator settings.



Weight & Balance - Part

Selection: Calculation Status :  Persistence Status : 

Computed Results | **Mass Types** | Materials | Precisions | Documents

Active Mass Type:

Mass Type: Paste From:

Mass:

Center of Gravity

CGx: CGy: CGz:

Moment of Inertia

Ixx: Iyy: Izz:

Product of Inertia

Ixy: Ixz: Iyz:

☐ Mass Only, Use NHA for CG and I

Filter: Active Document:

Inertia Mode: ☒ Center Of Gravity ☐ Reference

Reference Mode: ☒ Current Part ☐ Root Product ☐ Custom Mode

Only the Mass type combo box is sensitive in this mode. Depending on the mass type selected, information displayed below this combo boxes are updated.

If the “Edit” button is hit, the fields are updatable if the selected mass type is not of type Computed. The Active Mass Type combo box is also available. If the “ByActiveType” option is selected during an assembly calculation, the W&B processor will take the values of the active type selected here for this specific part. Make sure to click on the save button before closing the window or all modifications will be lost.

The Paste From combo allows to Paste value from another Mass Type in the Current one.

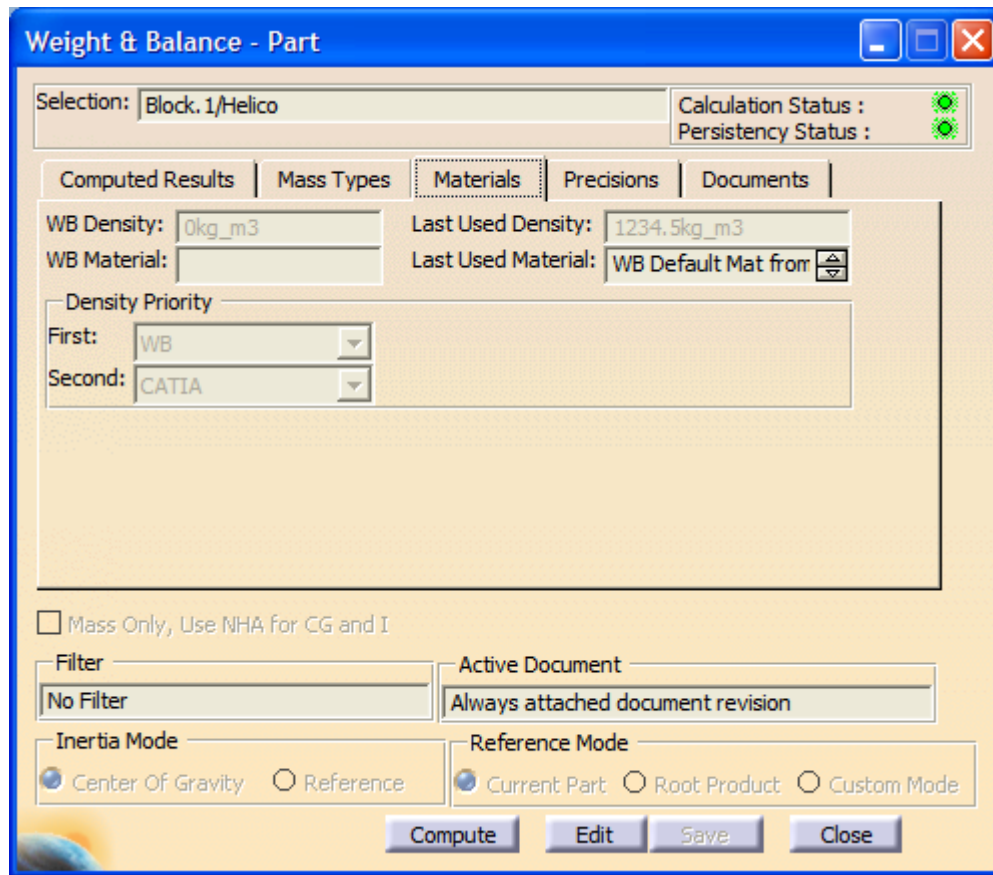
The Adjust button is available be right after the values have been pasted. When the user modifies the Mass from the previously copied value, this command will adjust the moment and product of inertia proportionally to this new mass.

The Delete button becomes active as an assigned mass type value has been entered. A single push on this button deletes de W&B data entered for this mass type.

If the “Edit”button is hit, the “Mass Only, Use NHA for CG and I’ check box is enabled. This allows user to define the currently selected part as a Standard Part.

Material tab

This tab displays the material information on the part and the density priority.



The dialog box 'Weight & Balance - Part' has a title bar with standard window controls. The 'Selection' field contains 'Block.1/Helico'. To the right, 'Calculation Status' and 'Persistency Status' are both indicated by green icons. Below these are five tabs: 'Computed Results', 'Mass Types', 'Materials' (which is selected), 'Precisions', and 'Documents'. The 'Materials' tab contains several input fields: 'WB Density' (0kg_m3), 'WB Material' (empty), 'Last Used Density' (1234.5kg_m3), and 'Last Used Material' (WB Default Mat from). Below these is a 'Density Priority' section with 'First' set to 'WB' and 'Second' set to 'CATIA'. At the bottom of the tab are two checkboxes: 'Mass Only, Use NHA for CG and I' (unchecked) and 'Filter' (No Filter). To the right of these is an 'Active Document' field set to 'Always attached document revision'. Below the 'Filter' field are two sections: 'Inertia Mode' with radio buttons for 'Center Of Gravity' (selected) and 'Reference' (unselected), and 'Reference Mode' with radio buttons for 'Current Part' (selected), 'Root Product' (unselected), and 'Custom Mode' (unselected). At the very bottom are four buttons: 'Compute', 'Edit', 'Save', and 'Close'.

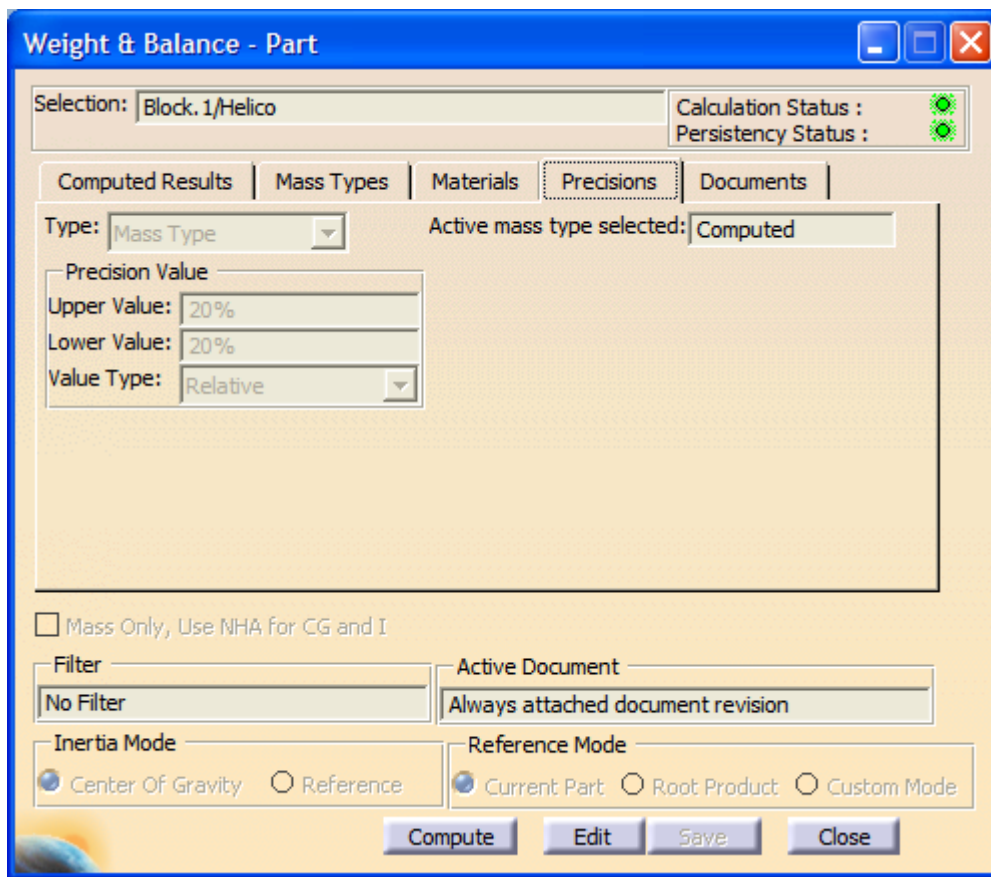
The user can add his material name and density, if the density priority is set to first priority for WB. The Edit button must be hit to be able to modify these fields.
If a non-zero value has been entered and if the density priority is set to WB then the CATIA density will be taken by default.

The Last Used Density and Last Used Material are for information purpose. They correspond to the material used in the last computation. They may correspond to a material defined in Weight & Balance, a material defined in CATIA Material, an imposed Mass Type or a Default Material.

When modifying attributes in the Material Tab, the last calculation date is removed to make sure that the part will not be up to date. This is linked to the WC9UpdateToleranceDelay (see installation guide for more details).

Precision tab

This tab displays the precision information for the calculations of deviations.



The dialog box is titled "Weight & Balance - Part". It features a "Selection:" field with the text "Block. 1/Helico". To the right, there are two status indicators: "Calculation Status" and "Persistency Status", both showing green checkmarks. Below these are five tabs: "Computed Results", "Mass Types", "Materials", "Precisions" (which is currently selected), and "Documents". The "Precisions" tab contains a "Type:" dropdown menu set to "Mass Type", and an "Active mass type selected:" field set to "Computed". Below this is a "Precision Value" section with three input fields: "Upper Value:" (20%), "Lower Value:" (20%), and "Value Type:" (Relative). At the bottom of the dialog, there is a checkbox labeled "Mass Only, Use NHA for CG and I". Below this are two more sections: "Filter" (set to "No Filter") and "Active Document" (set to "Always attached document revision"). At the very bottom, there are two groups of radio buttons: "Inertia Mode" (with "Center Of Gravity" selected) and "Reference Mode" (with "Current Part" selected). Finally, there are four buttons at the bottom: "Compute", "Edit", "Save", and "Close".

If the Edit button is hit, the "Type" combo box will become sensitive. If the User defined value is chosen, the fields in the "Precision Value" frame will become editable.

Depending on the "Value Type" chosen, the Lower and Upper values entered by the user will be taken as a mass for "Absolute" value and a percentage for the "Relative" value.

Document tab

This tab is only available if the "Use Documents" option has been enabled through the "ENOWBSettingsEditor" by the Administrator. Through this tab, it is possible to select the active document revision that will be used for the computation of the part.

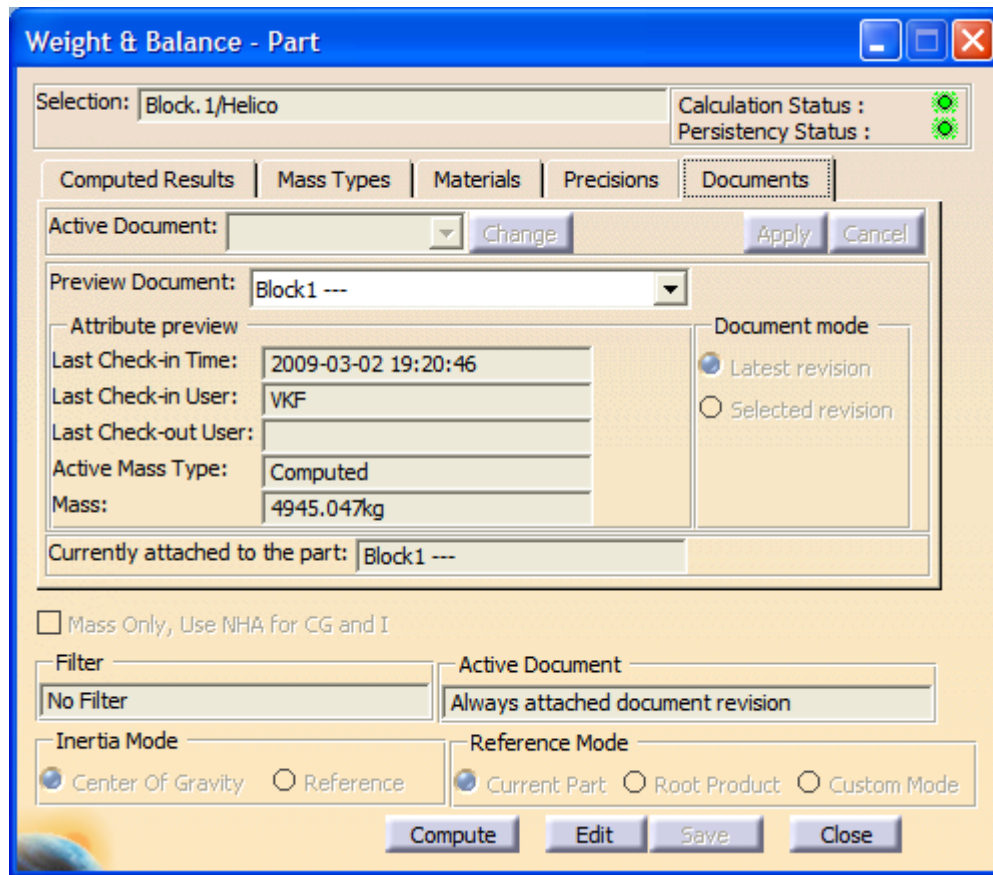
The "Document mode" allows choosing if the document should always be the latest revision, either the latest revision attached on the part or the latest revision available in the database depending on the setting defined by the Administrator, or a selected revision of the document currently attached to the part.

The "Preview Document" dropdown allows the user to preview some attributes on the available document revisions.

To change the document revision, the user must click on the "Edit" button, select the "Selected revision" button, click on the "Change" button, select the new Active Document, click on the "Apply" button and click on the "Save" button.

To default back to the Latest revision, the user must click on the "Edit" button and select "Latest revision" and click on "Save" to save the changes.

Note that the other tabs of this panel will show the "Active Document" field when the "Use Documents" has been enabled by the Administrator.



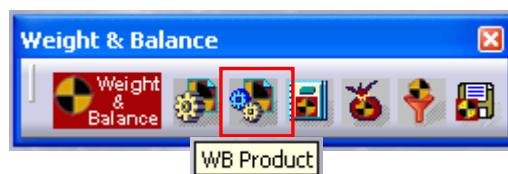
Support for paint, coating and other Standard Parts

Standard parts like paint, coating are distributed all over the body of the assembly and they have certain mass. Since they are distributed all over the assembly, it is not justified to compute their CG and Inertia though they contribute towards it by virtue of their mass. So, a new option is added to the instance in WB Part command to identify a particular instance as a Standard Part. During report generation, the mass of the standard part will be taken into account for the NHA CG and Inertia computation. The proportionate Inertia will be applied for Standard parts. The CG of the standard part is same as it NHA. The formula for Inertia of Standard part is

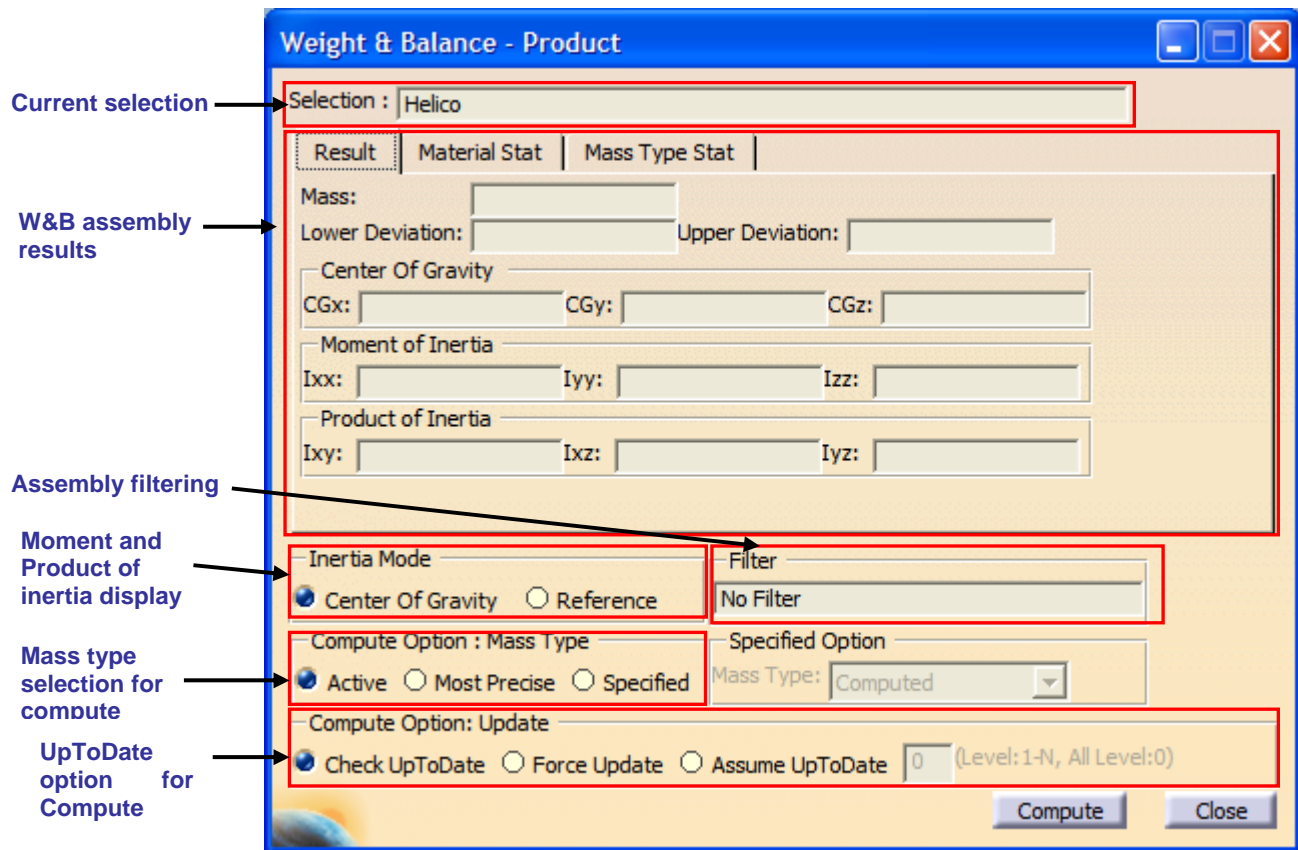
$$INERTIA_{Std} = INERTIA_{NHA} * \frac{MASS_{Std}}{MASS_{NHA}}$$

The WB Product Command

To display the assembly calculation, the user only needs to click on the "WB Product" command button.



The root of the VPM Graph window is automatically selected.



Assembly Results tabs

This tab displays the result of the W&B compute on the assembly.

Weight & Balance - Product

Selection : Helico

Result	Material Stat	Mass Type Stat
Mass:	9899.646kg	
Lower Deviation:	1979.929kg	Upper Deviation: 1979.929kg
Center Of Gravity		
CGx:	8587.624mm	CGy: 32.301mm CGz: 2570.111mm
Moment of Inertia		
Ixx:	30530.344kgxm2	Iyy: 187342.323kgxm2 Izz: 215486.767kgxm2
Product of Inertia		
Ixy:	29537.399kgxm2	Ixz: -7053.556kgxm2 Iyz: -5089.165kgxm2

Inertia Mode: ☒ Center Of Gravity ☐ Reference

Filter: No Filter

Compute Option : Mass Type

☒ Active ☐ Most Precise ☐ Specified

Specified Option: Mass Type: Computed

Compute Option: Update

☒ Check UpToDate ☐ Force Update ☐ Assume UpToDate 0 (Level: 1-N, All Level:0)

Compute **Close**

This tab is updated when the “Compute” button has been hit. The results displayed can be modified depending on the Inertia selected.

The “Compute Option” offers 3 possibilities.

1. Active: the mass type chosen for every part is the Active one (see chapter 3.4.2)
2. Most Precise: the mass type defined as most precise in the administrator settings is chosen for every part. If the most precise setting has no values assigned for a single part, the second one is taken and so on and so forth...
3. Specified: if this option is chosen, the “Specified Option” frame become sensitive. A list of mass types from the administrator settings is available. If the mass type chosen has no values assigned, the active mass type is chosen. A warning message is displayed to warn the user.

W&B Warnings

Warnings during W&B calculation process :

- WBComputePart2 : Measured mass type has not been assigned. Active type used : Computed

OK

Material Stat tab

This tab displays the material statistics after a calculation.

Weight & Balance - Product

Selection : Helico

Result | **Material Stat** | Mass Type Stat

Material	Density	Mass	% Mass
WB Default Mat from Settings	1234.5kg_m3	9890.094kg	99.9%
WB Default Mat from Settings	1.235kg_m2	9.552kg	0.0965%

Inertia Mode: ☒ Center Of Gravity ☐ Reference

Filter: No Filter

Compute Option : Mass Type: ☒ Active ☐ Most Precise ☐ Specified

Specified Option: Mass Type: Computed

Compute Option: Update: ☒ Check UpToDate ☐ Force Update ☐ Assume UpToDate 0 (Level: 1-N, All Level:0)

Compute Close

The first column displays the name of the material. If a mass type is displayed, it means that several parts have values been assigned. If a W&B mass is assigned by the user to a part, the density has no means for the calculation.

The second column displays the density used for the computation. Note that the density displayed can have different origins from 1 row to another. In the example above, the density of the second row has been assigned by the user, while the one from the third row has been evaluated from CATIA.

The third column displays the mass used for the computation. Each material is displayed only once and the mass displayed is the result of the addition of all the masses from the same material.

The last column displays the percentage of the material present in the part.

Mass Type Stat tab

This tab displays the mass type distribution after a calculation.

Weight & Balance - Product

Selection : Helico

Result | Material Stat | **Mass Type Stat**

Mass Type	Mass	% Mass
Computed	9899.65kg	100%

Inertia Mode
☒ Center Of Gravity ☐ Reference

Filter
 No Filter

Compute Option : Mass Type
☒ Active ☐ Most Precise ☐ Specified

Specified Option
 Mass Type: Computed

Compute Option: Update
☒ Check UpToDate ☐ Force Update ☐ Assume UpToDate 0 (Level: 1-N, All Level:0)

Compute Close

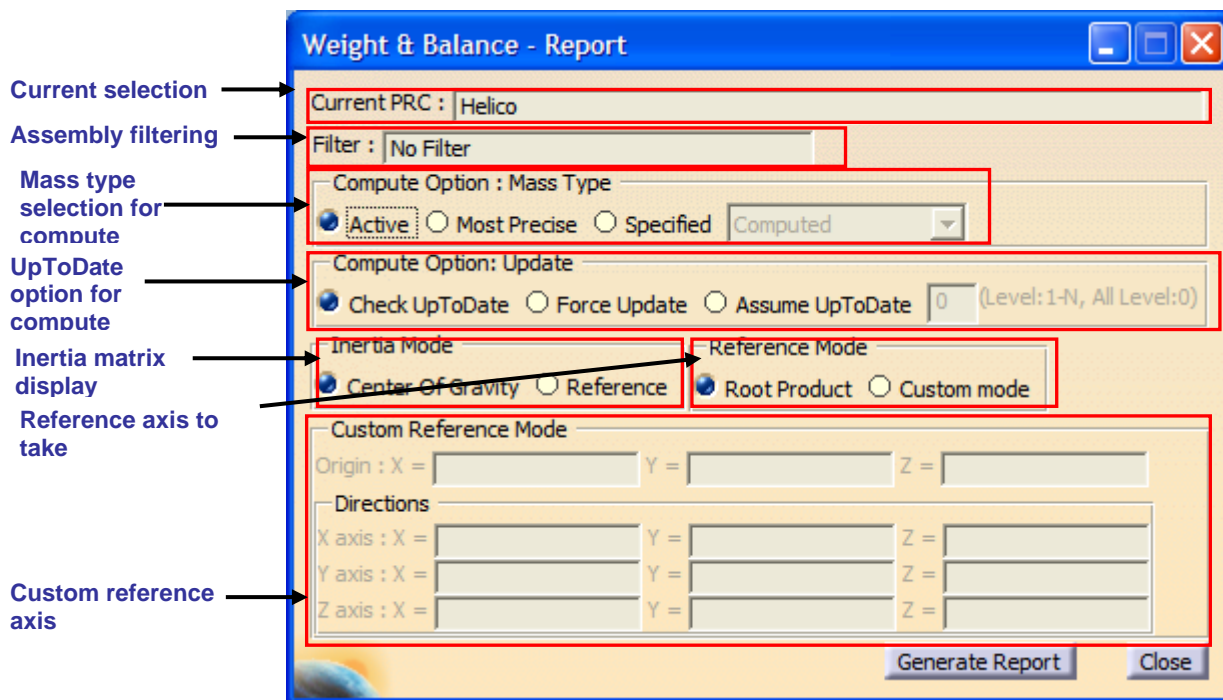
The first column displays the different mass type used in the calculation of the W&B data for an assembly.
 The second column displays the total mass of each mass type.
 The third column displays the percentage of each mass types present in the assembly.

The WB Report Command

To generate a report on the assembly calculation, the user needs to click on the “WB Report” command button.



The root of the VPM Graph window is automatically selected.



The report will display W&B compute for the assembly and for each part.

Every option is the same as the ones for the calculation of the assembly. Only the “Reference Mode” has been added to display the moment and product of inertia of each part in 3 different kinds of axis.

1. Root Product: The reference axis is the one of the PRC.
2. Custom Mode: The user can add its own reference axis and point of origin.

Note: if the Custom Mode is selected and blanks are left in one or several fields, the system will assume they are 0 values.

Once every option has been set, the user will click on the “Generate button”. A preview panel will appear showing every Weight & Balance Attributes. Warning messages are displayed in case of wrong specified mass types.

Example:

Report Preview

Current PRC : Helico

Report

II Level	V ID	WB Mass	COGx	COGy	COGz	MOIxx	MOIyy	MOIzz	POIxy	POIxz	POIyz	WB Lower deviation	WB Upper deviation
0	Helico	9899.646	8587.624	32.301	2570.111	30530.344	187342.323	215486.767	29537.399	-7053.556	-5089.165	1979.929	1979.929

II Level	V instance ID	V ID	WB Mass	COGx	COGy	COGz	MOIxx	MOIyy	MOIzz	POIxy	POIxz	POIyz	Density	Material
1	Block.1	Block	4945.047	8792.675	-1283.725	2750	212.969	99234.771	99241.697	0	0	0	1234.5	WB Default Mat from Settr
1	Block.2	Block	4945.047	8386.607	1349.256	2393.405	12833.129	87261.126	98595.182	32171.76	-7444.72	-2775.279	1234.5	WB Default Mat from Settr
1	SurfacePart.1	SurfacePart	9.552	6499.136	-449.061	922.483	0.689	56.661	57.292	-0.429	0.237	0.004	1.235	WB Default Mat from Settr
1	WMM - Helico.1	WMM - Helico	0	0	0	0	0	0	0	0	0	0		

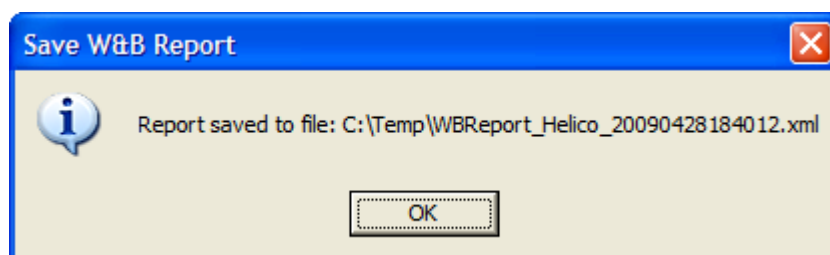
☐ Display Units Next to Values
 ☐ Display Trailing Zeros

Save Save As Close

The user can choose if he wants the report to be saved in an xml format or not.

If Save button is pushed, a notification window will appear showing the path where the report has been saved generated.

Example:



Note: The folder, where the report is generated, corresponds to the temporary directory assigned to the variable REPORTPATH.

The generated report is an XML file. An XML style sheet (XSL) is provided to generate an HTML type report. W&B data and other attributes (see chapter on administrator settings) defined by the administrator are displayed. The user is free to create his own XSL to display W&B results according to his wishes.

XML Report architecture:

```
<?xml version='1.0' ?>
<?xml-stylesheet type="text/xsl" href="C:\Temp\WBReport_StyleSheet.xsl"?>
<Report Title = "Report W&B" .....>
  <PRC .....>
    <PartInstance ..... />
    <PartInstance ..... >
    <PartInstance ..... />
  < / PartInstance >
< / PRC>
< / Report>
```

Example of XML with Weight & Balance style sheet applied:

WB Report - Windows Internet Explorer

C:\JSPWC9WBClient\Reports\WBReport_BracketAssembly_20082115521.xml

Google

File Edit View Favorites Tools Help

WB Report

Page Tools

Computation Units	Mass	Density	Center of gravity	Moment of inertia	Product of inertia	Inertia Reference Point	Inertia Reference Axis
	kg	kg_m3	in	kgxm2	kgxm2	Center of gravity	Root Product

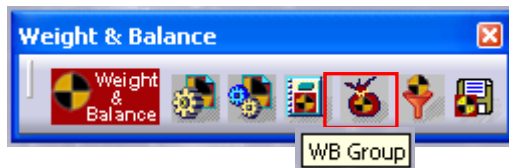
PRC V_ID	WBMass	WBLowerDeviation	WBUpperDeviation	CGx	CGy	CGz	MOIxx	MOIyy	MOIzz	POIxy	POIxz	POIyz
BracketAssembly	0.779046	0.0590608	0.0590608	3.70635	1.01709	0.62902	0.001	0.002	9.809e-004	-1.634e-007	-3.256e-004	1.698e-004

Part Instance level	Instance ID	Part ID	WBMass	Material	Density	WB Lower Deviation	WB Upper Deviation	WB Density	WB Active Mass Type	WB Last Imposed Mass Type	WB Last Calculation Date	CGx	CGy	CGz	MOIxx	MOIyy	MOIzz	POIxy	POIxz	POIyz
1	BracketIntermediary.1	BracketIntermediary	0.389523			0.0295304	0.0295304	0	Computed	Computed	08-02-01 15:05 18s	3.70635	1.01709	0.62902	5.952e-004	8.955e-004	4.5			
2	Bolt.1	Bolt	0.00543496	WBMaterial	1384	0.0005435	0.0005435	1384	Computed	Computed	08-01-31 13:35 16s	3.12069	1.02953	2.39208	1.495e-007	7.233e-007	7.2			
2	Bolt.2	Bolt	0.00543496	WBMaterial	1384	0.0005435	0.0005435	1384	Computed	Computed	08-01-31 13:35 16s	5.60098	1.01665	-0.10792	7.233e-007	7.233e-007	1.4			
2	Bracket.1	Bracket	0.188439	Measured	0	0.00942195	0.00942195	0	Measured	Measured	69-12-31 19:00 00s	3.90445	1.01631	0.59538	1.598e-004	3.126e-004	1.6			
2	Plate.1.1	Plate1	0.103463	Aluminium	2710	0.0103463	0.0103463	0	Computed	Computed	08-01-31 12:18 34s	2.54982	1.01823	1.76867	1.752e-004	1.445e-004	3.1			
2	Plate.2.1	Plate2	0.0867515	Magnesium	1798	0.00867515	0.00867515	0	Computed	Computed	08-01-31 12:18 35s	4.57331	1.01665	-0.72138	5.769e-005	8.541e-005	1.4			
1	Product.2.1	Product2	0.389523			0.0295304	0.0295304	0	Computed	Computed	08-02-01 15:05 19s	3.70635	1.01709	0.62902	5.952e-004	8.955e-004	4.5			
2	Product.3.1	Product3[1]	0.389523			0.0295304	0.0295304	0	Computed	Computed	08-02-01 15:05 19s	3.70635	1.01709	0.62902	5.952e-004	8.955e-004	4.5			
3	Bolt.1	Bolt	0.00543496	WBMaterial	1384	0.0005435	0.0005435	1384	Computed	Computed	08-01-31 13:35 16s	3.12069	1.02953	2.39208	1.495e-007	7.233e-007	7.2			
3	Bolt.2	Bolt	0.00543496	WBMaterial	1384	0.0005435	0.0005435	1384	Computed	Computed	08-01-31 13:35 16s	5.60098	1.01665	-0.10792	7.233e-007	7.233e-007	1.4			
3	Bracket.1	Bracket	0.188439	Measured	0	0.00942195	0.00942195	0	Measured	Measured	69-12-31 19:00 00s	3.90445	1.01631	0.59538	1.598e-004	3.126e-004	1.6			
3	Plate.1.1	Plate1	0.103463	Aluminium	2710	0.0103463	0.0103463	0	Computed	Computed	08-01-31 12:18 34s	2.54982	1.01823	1.76867	1.752e-004	1.445e-004	3.1			
3	Plate.2.1	Plate2	0.0867515	Magnesium	1798	0.00867515	0.00867515	0	Computed	Computed	08-01-31 12:18 35s	4.57331	1.01665	-0.72138	5.769e-005	8.541e-005	1.4			

See [Description of report basic attributes](#)

The WB Group Command

This command is used to compute and generate reports on a group of part instances.



A part instance needs to be selected in order to display the Weight & Balance - Group panel. There are three tabs in this panel.

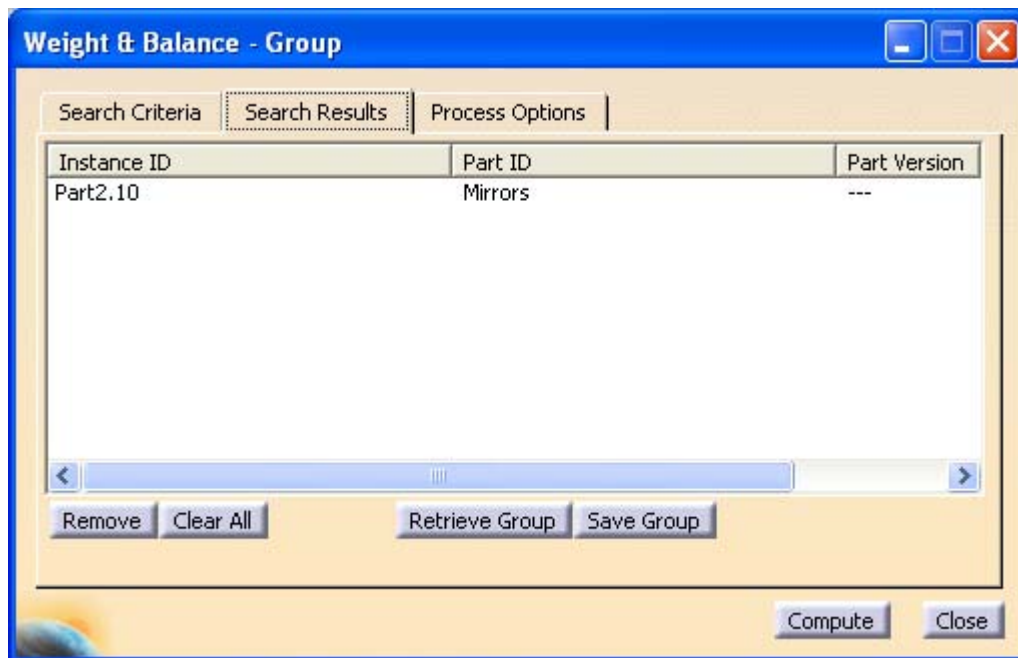
The Search Results tab presents the list of instances currently selected.

The Remove button is used to remove lines of instances from the list.

The Clear All button is used to remove all the lines of instances from the list.

The Retrieve Group button allows the retrieval of the last group of instances previously saved locally by the current user on the current Product with the same Config Handler applied.

The Save Group button allows the save of the current group of instances by the current user on the current Product with the same Config Handler applied.



The Search Criteria tab presents the list of criterias to be used for querying instances from the current Product.

The Remove button is used to remove lines of criteria from the list.

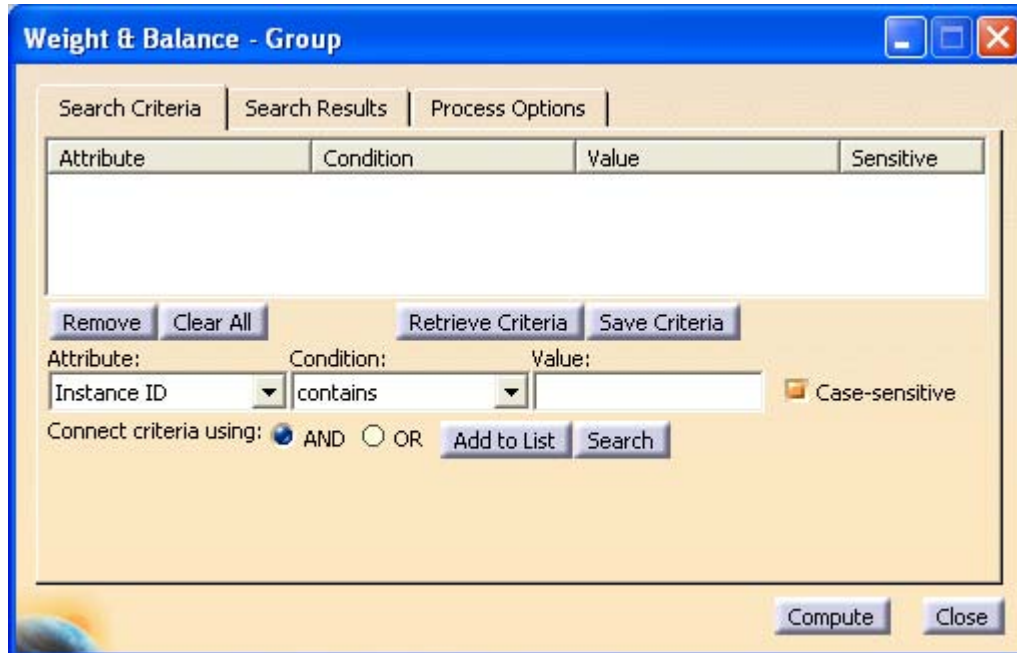
The Clear All button is used to remove all the lines of criteria from the list.

The Retrieve Group button allows the retrieval of the last group of criteria previously saved locally by the current user on the current Product with the same Config Handler applied.

The Save Group button allows the save of the current group of criteria by the current user on the current Product with the same Config Handler applied.

The Add to List button is used to add a criterion to the list.

The Search button is used to search in the database for instances corresponding to the current criteria.



Weight & Balance - Group

Search Criteria | Search Results | Process Options

Attribute	Condition	Value	Sensitive

Remove Clear All Retrieve Criteria Save Criteria

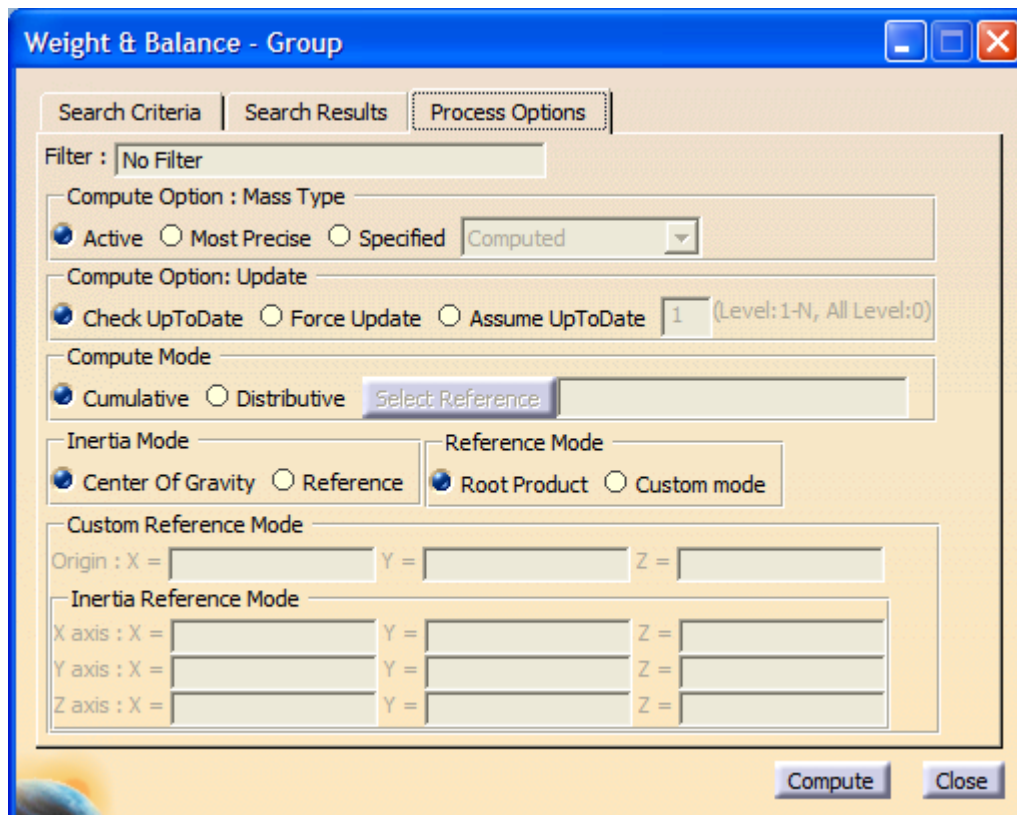
Attribute: Instance ID Condition: contains Value:

Connect criteria using: ☒ AND ☐ OR Add to List Search

Case-sensitive ☐

Compute Close

The Process Options tab presents the same compute options then with the WB Report command.



Weight & Balance - Group

Search Criteria | Search Results | Process Options

Filter : No Filter

Compute Option : Mass Type

☒ Active ☐ Most Precise ☐ Specified

Compute Option: Update

☒ Check UpToDate ☐ Force Update ☐ Assume UpToDate (Level: 1-N, All Level:0)

Compute Mode

☒ Cumulative ☐ Distributive

Inertia Mode Reference Mode

☒ Center Of Gravity ☐ Reference ☒ Root Product ☐ Custom mode

Custom Reference Mode

Origin : X = Y = Z =

Inertia Reference Mode

X axis : X = Y = Z =

Y axis : X = Y = Z =

Z axis : X = Y = Z =

Compute Close

When clicking on compute, a preview report will be open showing the instances of the subassembly selected under the current PRC.

Distributive Analysis

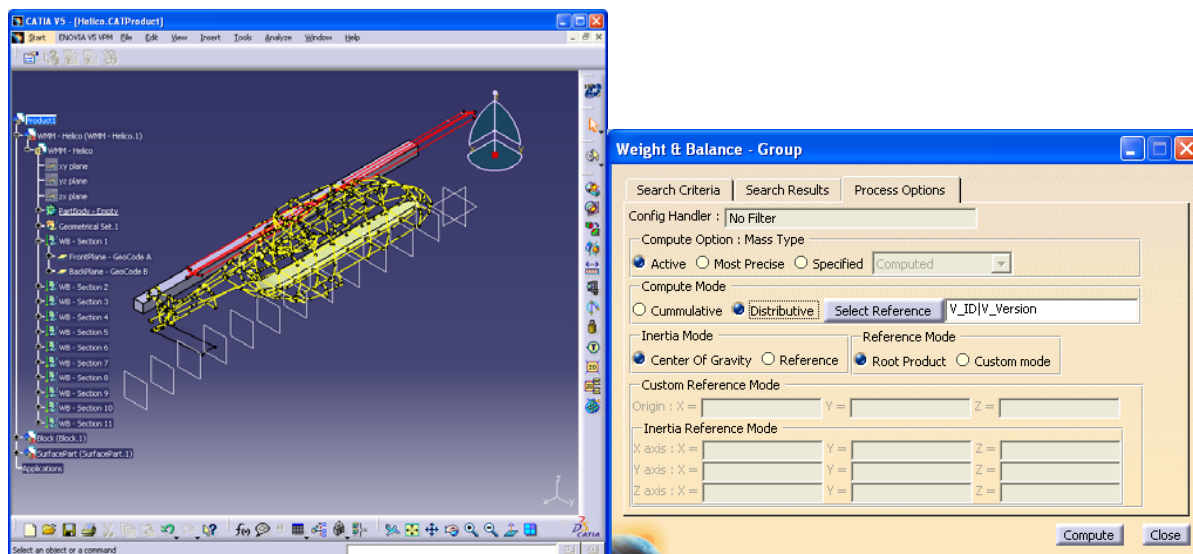
Distributive Analysis corresponds to returning the results distributed according to the different section of the vehicle.

Distributive Analysis corresponds to the sectioning of the geometry for each Part Instance and returning the results for the portions completely included in the section.

This method of analysis corresponds to the typical way of working for airplane manufacturers. They are not only interested in retrieving the mass properties of the different parts but also to retrieve the mass properties according to each sections of the vehicle.

A Weight Master Model must be defined associated to the distributive Analysis

- The V_ID and V_Version are keyed in or the Document is selected from the current VPM Navigator window.
- The WMM contains several section definitions.
 - Each section is defined by planes or surfaces. The planes can be defined along axes or inclined to the axis system
 - These elements are properly oriented to point the inside of the section.



A section-wise report is generated for each selected instance and a cumulative for PRC.

Report Preview														
Current PRC : ODT_Helico														
Report														
	WB Mass	COGx	COGy	COGz	Name	MOIxx	MOIyy	MOIzz	POIxy	POIxz	POIyz	WB Lower Deviation	WB Upper Deviation	
1	991.069	2236.4	-1282.92	2748.5	WB - Section 1	3.381e+006	2.886e+006	1.009e+006	-243738	455646	1.406e+006	198.214	198.214	
2	991.837	3790.8	-1282.37	2747	WB - Section 2	6.62e+006	7.043e+006	2.666e+006	33899.1	-75059.3	2.484e+006	198.367	198.367	
3	991.944	5345.39	-1282.3	2746.79	WB - Section 3	7.027e+006	1.434e+007	9.612e+006	133587	-301792	2.601e+006	198.389	198.389	
4	991.945	6900	-1282.3	2746.79	WB - Section 4	7.032e+006	2.68e+007	2.208e+007	211422	-477544	2.603e+006	198.389	198.389	
5	991.945	8454.61	-1282.3	2746.79	WB - Section 5	7.032e+006	4.481e+007	4.009e+007	288400	-651411	2.603e+006	198.389	198.389	
6	991.99	10009.2	-1282.27	2746.8	WB - Section 6	6.861e+006	6.816e+007	6.366e+007	354900	-779605	2.587e+006	198.398	198.398	
7	990.393	11564.2	-1283.56	2749.73	WB - Section 7	575473	9.201e+007	9.174e+007	156868	-263781	252802	198.079	198.079	
8	990.225	13119.1	-1283.72	2750	WB - Section 8	42.646	1.26e+008	1.26e+008	-3.085	-2.874	-1.588e-022	198.045	198.045	
9	990.225	14673.8	-1283.72	2750	WB - Section 9	42.646	1.661e+008	1.661e+008	-3.085	-2.874	-1.588e-022	198.045	198.045	
10	693.483	15892.1	-1286.5	2747.42	WB - Section 10	22119.8	3.112e+007	3.112e+007	606605	565000	-11017.2	138.697	138.697	
11	15.2	16523.8	-1283.72	2750	WB - Section 11	0.655	0.32	0.341	0	0	0	3.04	3.04	

Sr.No.	COGx	COGy	COGz	Name	V ID	MOIxx	MOIyy	MOIzz	POIxy	POIxz	POIyz	Density	WB Mass	Material
1	2250	-1283.72	2750	WB - Section 1	ODT_Block	20.597	99.634	100.304	0	0	0	1234.5	478.244	WB Default
2	3750	-1283.72	2750	WB - Section 2	ODT_Block	20.597	99.634	100.304	0	0	0	1234.5	478.244	WB Default
3	5250	-1283.72	2750	WB - Section 3	ODT_Block	20.597	99.634	100.304	0	0	0	1234.5	478.244	WB Default
4	6750	-1283.72	2750	WB - Section 4	ODT_Block	20.597	99.634	100.304	0	0	0	1234.5	478.244	WB Default
5	8250	-1283.72	2750	WB - Section 5	ODT_Block	20.597	99.634	100.304	0	0	0	1234.5	478.244	WB Default
6	9750	-1283.72	2750	WB - Section 6	ODT_Block	20.597	99.634	100.304	0	0	0	1234.5	478.244	WB Default
7	11250	-1283.72	2750	WB - Section 7	ODT_Block	20.597	99.634	100.304	0	0	0	1234.5	478.244	WB Default
8	12750	-1283.72	2750	WB - Section 8	ODT_Block	20.597	99.634	100.304	0	0	0	1234.5	478.244	WB Default
9	14250	-1283.72	2750	WB - Section 9	ODT_Block	20.597	99.634	100.304	0	0	0	1234.5	478.244	WB Default
10	15750	-1283.72	2750	WB - Section 10	ODT_Block	20.597	99.634	100.304	0	0	0	1234.5	478.244	WB Default
11	16523.8	-1283.72	2750	WB - Section 11	ODT_Block	0.655	0.32	0.341	0	0	0	1234.5	15.2	WB Default
12	2223.19	-1283.72	2750	WB - Section 1	ODT_Block	22.049	122.294	123.011	-3.085	-2.874	0	1234.5	511.98	WB Default
13	3829	-1283.72	2750	WB - Section 2	ODT_Block	22.049	122.294	123.011	-3.085	-2.874	0	1234.5	511.98	WB Default
14	5434.81	-1283.72	2750	WB - Section 3	ODT_Block	22.049	122.294	123.011	-3.085	-2.874	0	1234.5	511.98	WB Default
15	7040.62	-1283.72	2750	WB - Section 4	ODT_Block	22.049	122.294	123.011	-3.085	-2.874	0	1234.5	511.98	WB Default
16	8646.43	-1283.72	2750	WB - Section 5	ODT_Block	22.049	122.294	123.011	-3.085	-2.874	0	1234.5	511.98	WB Default
17	10252.2	-1283.72	2750	WB - Section 6	ODT_Block	22.049	122.294	123.011	-3.085	-2.874	0	1234.5	511.98	WB Default
18	11858.1	-1283.72	2750	WB - Section 7	ODT_Block	22.049	122.294	123.011	-3.085	-2.874	0	1234.5	511.98	WB Default
19	13463.9	-1283.72	2750	WB - Section 8	ODT_Block	22.049	122.294	123.011	-3.085	-2.874	0	1234.5	511.98	WB Default
20	15069.7	-1283.72	2750	WB - Section 9	ODT_Block	22.049	122.294	123.011	-3.085	-2.874	0	1234.5	511.98	WB Default
21	16207.8	-1292.65	2741.69	WB - Section 10	ODT_Block	9.238	12.981	13.28	-0.644	-0.6	0.016	1234.5	215.239	WB Default
22	0	0	0	WB - Section 11	ODT_Block	0	0	0	0	0	0	1234.5	0	WB Default
23	2542.05	-339.723	985.242	WB - Section 1	ODT_SurfacePart	0.038	0.069	0.104	0.012	0.009	-5.735e-004	1.235	0.845	WB Default
24	3765.61	-448.859	901.682	WB - Section 2	ODT_SurfacePart	0.103	0.302	0.404	0.012	0.006	0.003	1.235	1.612	WB Default
25	5250.53	-464.716	899.803	WB - Section 3	ODT_SurfacePart	0.124	0.322	0.446	-5.936e-005	-2.175e-004	7.462e-005	1.235	1.719	WB Default
26	6750	-464.66	900	WB - Section 4	ODT_SurfacePart	0.124	0.323	0.447	0	0	0	1.235	1.721	WB Default
27	8250	-464.66	900	WB - Section 5	ODT_SurfacePart	0.124	0.323	0.447	0	0	0	1.235	1.721	WB Default
28	9763.36	-466.327	954.452	WB - Section 6	ODT_SurfacePart	0.137	0.345	0.463	-0.004	-0.049	0.004	1.235	1.766	WB Default
29	10579.1	-339.443	1162.19	WB - Section 7	ODT_SurfacePart	0.009	5.684e-004	0.009	-8.487e-004	-1.362e-004	4.154e-004	1.235	0.169	WB Default

☐ Display Units Next to Values ☐ Display Trailing Zeros

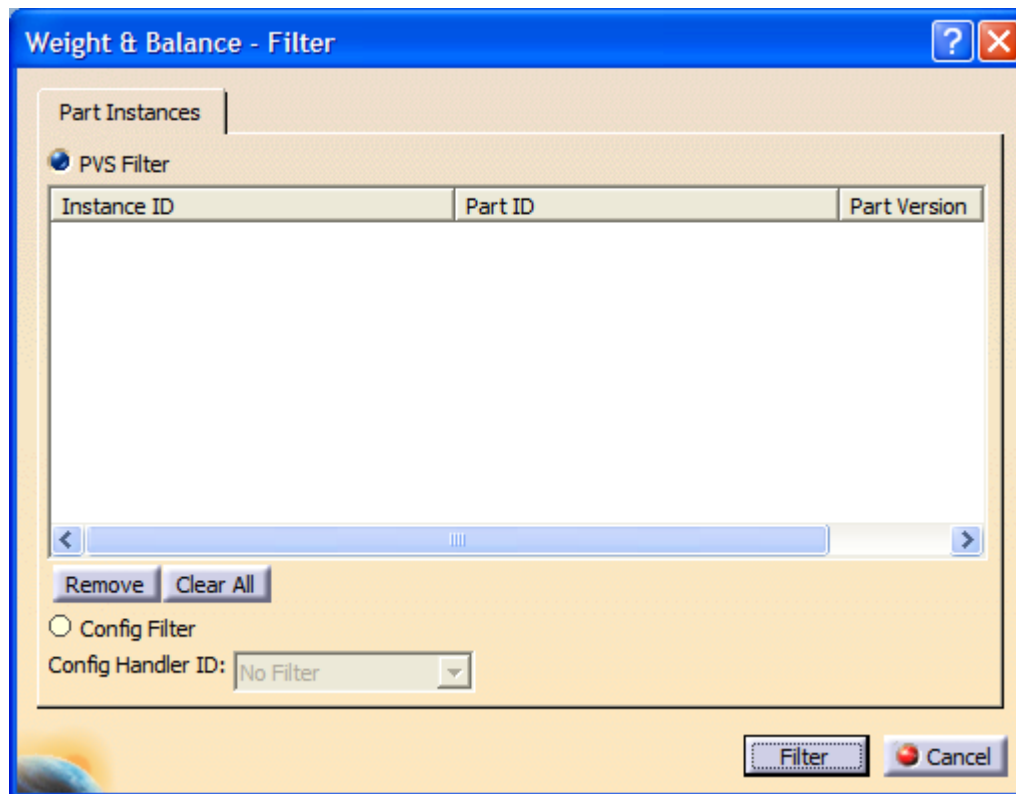
Save Save As Close

The WB Filter Command

In order to define which configuration filter or user defined filter aka VPM Nav filter aka PVS Filter to use on the assembly, the applied configuration handler or intended part instances needs to be selected.



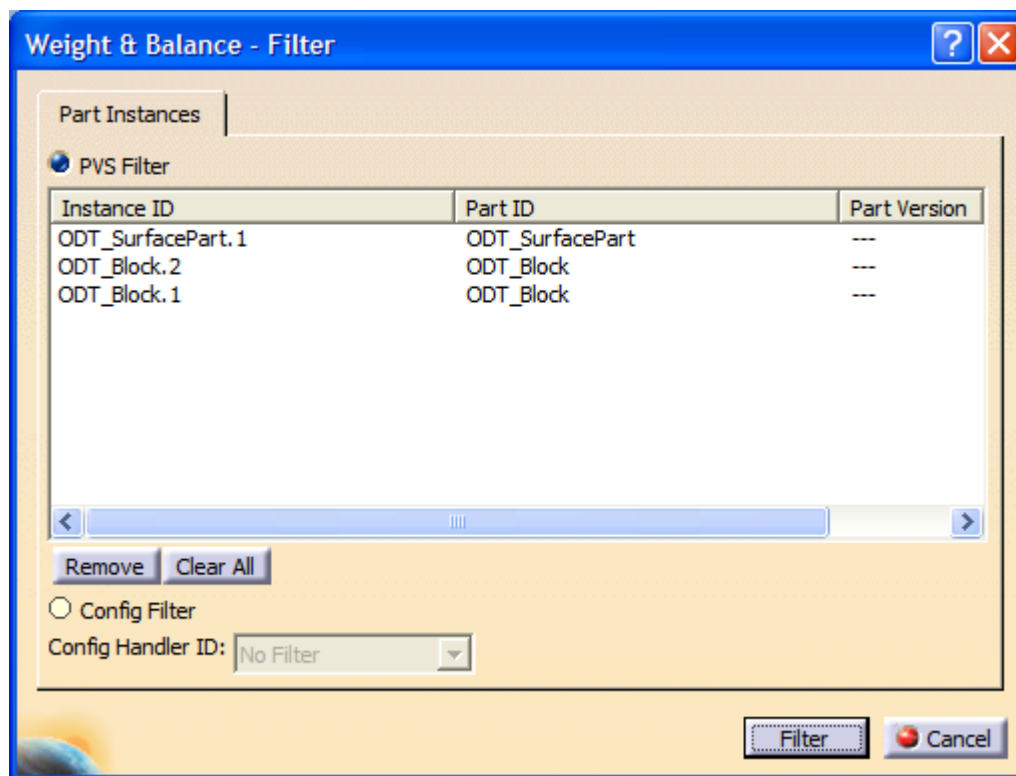
By default, the PVS Filter option is selected by default. User can select the instances from the VPM Nav spec tree to set them as filters. It is also possible to multiselect the required filter instances and launch the WB Filter command. User can set configuration handler defined on the ENOVIA server by selecting the Config Filter option and select the associated config handler from the dropdown box. Once a configuration Handler or PVS Filter has been chosen, it will be applied on any W&B calculation that needs it.



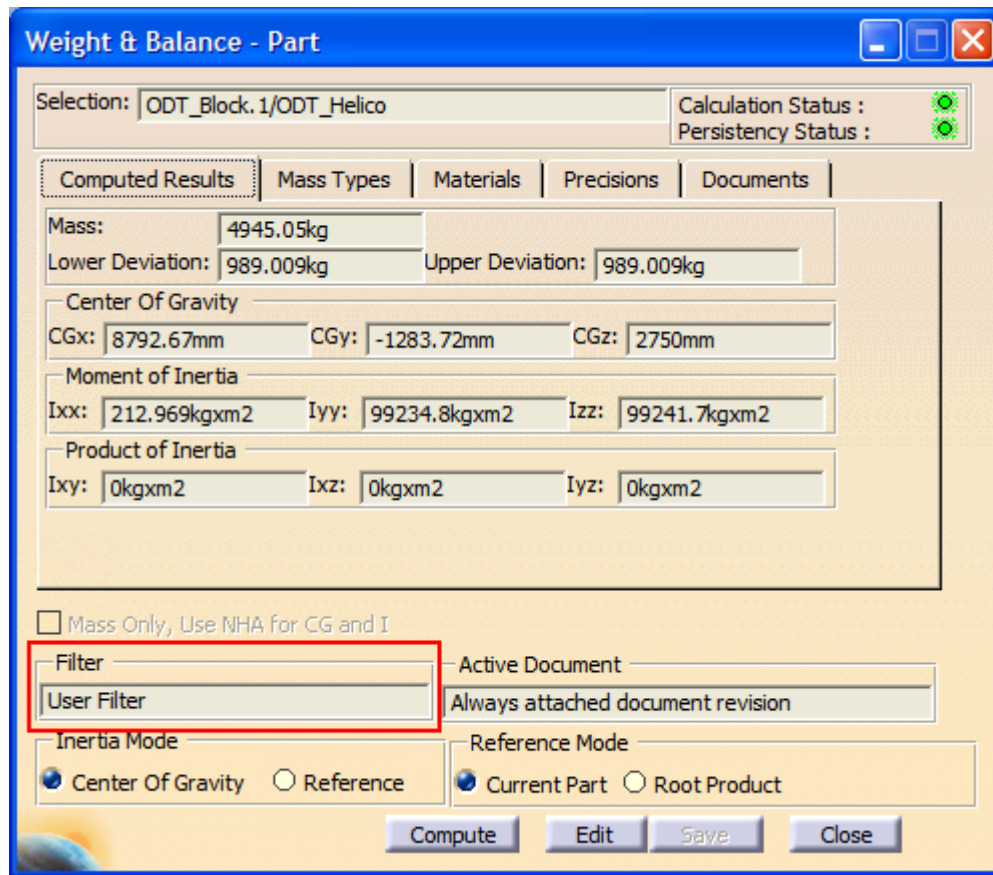
Support of VPM Navigator Filters

The WB Filter command now supports to select instances from the list as filter aka PVS Filter. User can multi-select the instance and launch the Filter command to set them as Filter.

The PVS Filter are not persistent and will be reset when the session is restarted. Though the filters are persistent in the session for the previous assembly. i.e. If in the same session, assembly is changed and PVS filters are set for it and switched back to the previous assembly, the PVS filters are available.





When PVS filter is set, the other commands display “User Filter” in the Filter text box, otherwise for the configuration handler, it displays the name of the config handler.



Weight & Balance - Part

Selection: ODT_Block.1/ODT_Helico

Calculation Status : 

Persistency Status : 

Computed Results | Mass Types | Materials | Precisions | Documents

Mass: 4945.05kg

Lower Deviation: 989.009kg Upper Deviation: 989.009kg

Center Of Gravity

CGx: 8792.67mm CGy: -1283.72mm CGz: 2750mm

Moment of Inertia

Ixx: 212.969kgxm2 Iyy: 99234.8kgxm2 Izz: 99241.7kgxm2

Product of Inertia

Ixy: 0kgxm2 Ixz: 0kgxm2 Iyz: 0kgxm2

☐ Mass Only, Use NHA for CG and I

Filter: User Filter

Active Document: Always attached document revision

Inertia Mode: ☒ Center Of Gravity ☐ Reference

Reference Mode: ☒ Current Part ☐ Root Product

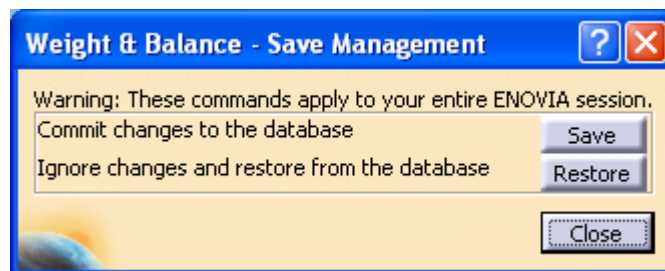
Compute Edit Save Close

The WB Save Command

The Save Management allows the user to commit the change to the database or to restore the values from the database. (See Process Flow for more details)



Note that these Save or Restore commands apply to the entire ENOVIA session and not only to the current VPM Navigator window.



Weight & Balance - Save Management

Warning: These commands apply to your entire ENOVIA session.

Commit changes to the database

Ignore changes and restore from the database

Weight & Balance batch processor

Independent to the VPM Navigator environment, W&B can be used as a batch program.

Using the application **ENOWBComputeAssembly**, the batch takes several parameters as inputs.

```

C:\Documents and Settings\okf\Desktop>ENOWBComputeAssembly -h
=====
DSTracing object informations
=====
Version level                : 2.07
DSTRACE_ELAPSED              : Unset, elapsed time will be printed. Set DSTRACE_ELAPSED variable
DSTRACE_DUMP_ENV            : Unset, no environment variable will be printed. Set DSTRACE_DUMP_E
DSTRACE_ALL_ACTIVATED        : Not Activated
DSTRACE_LEVEL Variable value : 1
=====
Return code values:
=====
S_OK                         : 0
E_FAIL                       : -2147467259
S_FALSE                      : 1
E_ABORT                      : -2147467260
E_HANDLE                     : -2147024890
E_POINTER                    : -2147467261
E_NOTIMPL                    : -2147467263
E_UNEXPECTED                 : -2147418113
E_INVALIDARG                 : -2147024809
E_NOINTERFACE                 : -2147467262
=====
Dassault Systemes Release Informations
=====
Dassault Systemes Release level : B19
Dassault Systemes Service Pack level: 4
Dassault Systemes HOT Fix level : None
=====
main<
Starting Weight & Balance Batch...
Enter : ENOWBComputeAssembly [-h || -help] to access help menu
ArgumentParse<
PrintHelp<
HELP
HELP:
HELP:      Weight & Balance : Version 2.2
HELP:      Computation of W&B data on an assembly
HELP:
HELP:      How to use the batch :
HELP:
HELP: ENOWBComputeAssembly -PRC filename [-COpt -CHID -Report [-RefPoint]]
HELP: ENOWBComputeAssembly -Part filename [-COpt -CHID -Report [-RefPoint]]
HELP: ENOWBComputeAssembly -ALL [-COpt -CHID -Report [-RefPoint]]
HELP:
HELP: -PRC      : The path where the file containing PRC U_IDs.
HELP:           OR
HELP: -Part     : The path where the file containing PRC U_ID
HELP:           and list of Parts
HELP:           OR
HELP: -ALL      : All PRCs in the database are computed
HELP:
HELP: -COpt     : Compute Option (optional,default = 0)
HELP:           Possible values : By active type = 0
HELP:                           By most precise = 1
HELP:                           By Computed type = 2
HELP:
HELP: -Force    : Force computation of the assembly (optional, default = 0)
HELP:           Possible values: Check UpToDate = 0
HELP:                           Force Update = 1
HELP:                           Assume UpToDate = 2
HELP:
HELP: -Level    : Tree Level for Assume UpToDate (optional, default = 0)
HELP:           Possible Values: Any Level : 1 - N
HELP:                           All Level : 0
HELP:
HELP: -CHID     : Config handler ID to be applied on assembly (optional)
HELP: -Report   : A report is generated (optional,default = 0)
HELP:           Possible values: TRUE = 1
HELP:                           TRUE with Units = 2
HELP:                           FALSE = 0
HELP:
HELP: -RefMode  : Inertia reference point for Report values
HELP:           (optional,default = 0)
HELP:           Possible values: Center of gravity = 0
HELP:                           Reference = 1
HELP:
HELP: ENOWBComputeAssembly [-h || -help]
HELP: -h          : This help
HELP: -help       : This help
HELP:
HELP:
>
>
=====
DSTrace Name activation information
=====
Trace name                                     !
=====
WBBatchProcessor                             !                      Enabled
=====
C:\Documents and Settings\okf\Desktop>

```

PRC or **Part** or **ALL** option is mandatory.

Using the **PRC** option followed by the path of a file in the file system, the batch will open it and extract every single PRC V_ID found in this file following the rule that it will take only 1 PRC V_ID per line.

Example:

```
>ENOWBComputeAssembly -PRC C:\PRC_VIDs.txt
```

With PRC_VIDs.txt containing following lines:

WBPRC01

WBPRC02

Etc...

Similarly, **Part** option followed by the path of a file in the file system, the batch will open it and extract every single PRC V_ID found in this file followed by the part instances from the assembly following the rule that it will take only 1 PRC V_ID and part instance per line.

Example:

```
>ENOWBComputeAssembly -Part C:\Parts.txt
```

With Parts.txt containing following lines:

WBPRC01

WBPart1.1

WBPart2.1

Etc...

If **ALL** option is selected then all PRCs in the database will be updated.

Several other non mandatory options are available as explained in the screenshot above.

New computation modes are now available in the batch processing to make it compatible with the interactive commands

Force parameter provides the option to choose between Force Update, Assume-UpToDate and Check-UpToDate options.

Level option is used in Assume UpToDate mode for defining the level at which the assembly is assumed to be up-to-date.

Report parameter provides an extra option to save the report with local Units defined on the server.

Stop Restart of Batch for very large assembly

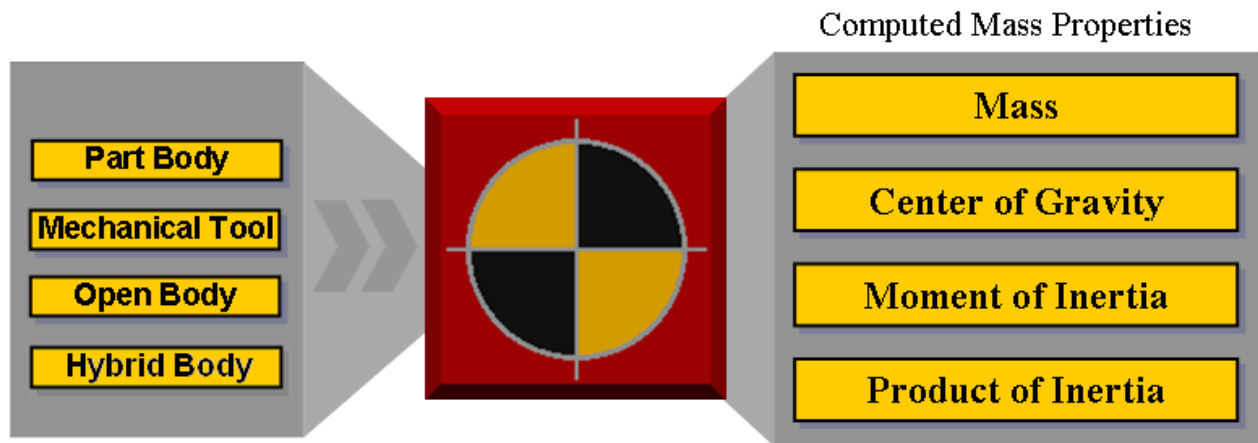
The new batch architecture facilitates to compute very large assemblies without dividing it in small batches.

It is required to set **WC9_BATCH_MEMORY_LIMIT** environment variable on the server side to the maximum allowed memory for the batch. The minimum value is set to 300 MB, otherwise the batch will exit. As soon as the memory is reached in between the computation, the temporary report is saved and the batch is launched again to continue from the previous state of the batch.

The Model Processors

The CATIA V5 processor computes the mass properties of selected CATPart, CATShape and CATProduct documents. The elements that can be processed and properties that can be computed are illustrated below.

Processed V5 Elements



The CATIA V5 processor also processes CGR and V4 Model files. However, the results do not offer the same level of granularity than for the CATPart (show / no-show, pick / no-pick, element type) they are returned by a service provided by DMU-SpaceAnalysis corresponding to the Measure inertia command.

Processing parameters

The input parameters of the Model Processor are the following:

CATIA V5 CATPart, CATShape or CATProduct.Assigned Density

Processing the CATIA geometry

The CATIA V5 geometry is processed using standard CATIA methods.

Processing the assigned Density (Density Priority)

The Weight & Balance V5 Processor uses the density assigned to V5 CATDocuments unless it finds a density assigned (using W&B for CATIA). If no density is found either in the Document or on a W&B attribute, a default density defined by the Administrator through the W&B Settings is used.

The density priority is set through the Material tab of the WB Part Command.

CATProduct BlackBox Processing

The BlackBox are processed either in exposed mode or in summary mode depending on the WB admin settings. Because of the API limitations, only "Ply" is supported and "Core" is not supported.

Appendix:

Description of report basic attributes

The following attributes are returned by the application.

- Report

- Title
- MassUnit
- LengthUnit
- DensityUnit
- InertiaMomentUnit
- SurfacicDensityUnit
- InertiaReferenceAxis
- InertiaReferencePoint

- PRC

- COGx
- COGy
- COGz
- MOIxx
- MOIyy
- MOIzz
- POIxy
- POIxz
- POIyz
- WB_Mass
- WB_Lower_deviation
- WB_Upper_deviation

- PartInstance

- COGx
- COGy
- COGz
- V_ID
- MOIxx
- MOIyy
- MOIzz
- POIxy
- POIxz
- POIyz
- Density
- WB_Mass
- Material
- WB_Density
- V_instance_ID (BB_Instance_ID in case of BlackBox document)
- WBMaterialName
- Density_dimension
- WBActiveMassTypeID
- WB_Lower_deviation
- WB_Upper_deviation
- WBLastCalculationDate
- WBLastImposedMassTypeID
- WB_Mass_Details

Note that the *V_ID* of the part and the *V_instance_ID* of the instance will be replaced by the name corresponding to the mask.

When the “Use Documents” mode is enabled, three new attributes will be visible in the report under the Part Instance:

- WBActiveDocumentID
- WB_Latest_doc_revision
- WB_Currently_attached_doc_revision

Other attributes on the Part or the Item Instance may be also reported if they have been declared the W&B setting by the Administrator.