Weight & Balance for ENOVIA V5 (WC9)

BPA Delivery 7 for V5R19 (V5.7)

Implementation Guide

V5R19

DASSAULT SYSTEMES

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Introduction

Weight is the single one parameter that influences the most the design of an aircraft.

- An aerospace project leader discovers late in the process that the real mass of the product is 200 pounds over the allocated objective
- A racing car engine provider has a request from governing instances to provide mass of a specific engine but can't answer because no data is collected throughout its lifecycle.
- New environment regulations render over 50% of your product line as non-compliant because of greenhouse gas emissions. All of a sudden, you need to redesign not only your models, but also optimize your CURRENT engines, platforms and all the various subsystems

With a process that includes a weekly mass calculation of the assembly:

- The aerospace project leader can identify the tendency of the vehicle mass to deviate from objective
- The race car engine provider can provide the mass of every single engine used during the season, and also be better prepared for each race
- New environmental regulations wouldn't be a problem because you could anticipate them and be a leader with respect to compliance

"Weight & Balance for ENOVIA V5" BPA (Business Process Accelerator) helps you to manage the mass properties of the product throughout its lifecycle, from development to production.

This implementation's guide describes and illustrates an industrial scenario to explain the role of "Weight & Balance for ENOVIA V5" BPA.

Notes: This document refers to and other guide (the user's guide) to explain all BPA's functionalities with more details.

Values proposition

The DS Weight & Balance BPA enables customers to efficiently manage the mass properties of the digital mock-up:

- Mass
- Center of Gravity
- Moment of Inertia
- Product of Inertia
- Mass Distribution
- Material Distribution
- Mass Type Distribution
- Seamless integration with
  - *ENOVIA VPM V5 – VPM Navigator*
- Fast computation of large assemblies
- Overnight batch processing
- Report generation

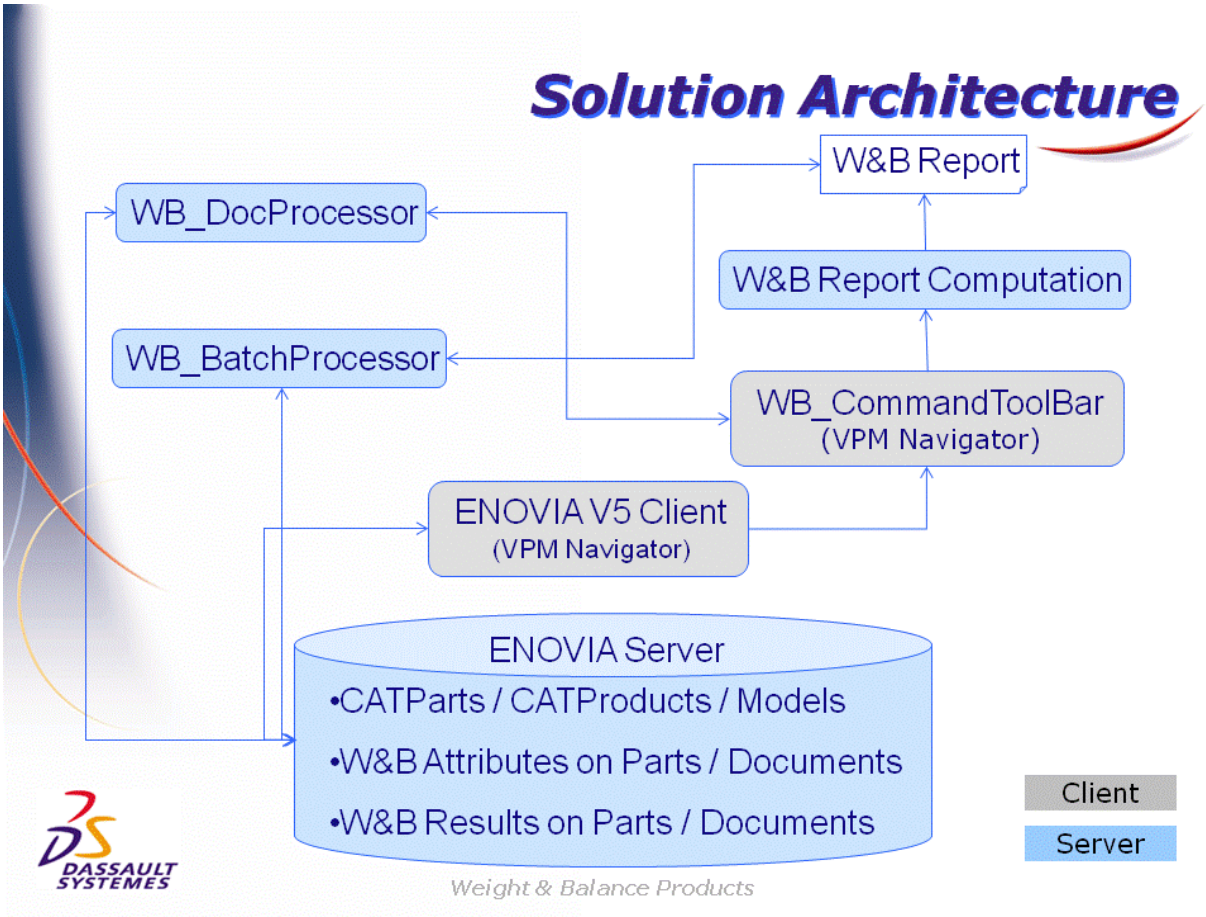
Weight & Balance eliminates:

- Different systems maintenance and Data duplication
- Some manual entries
- Manually opening the CAD models

Data organization

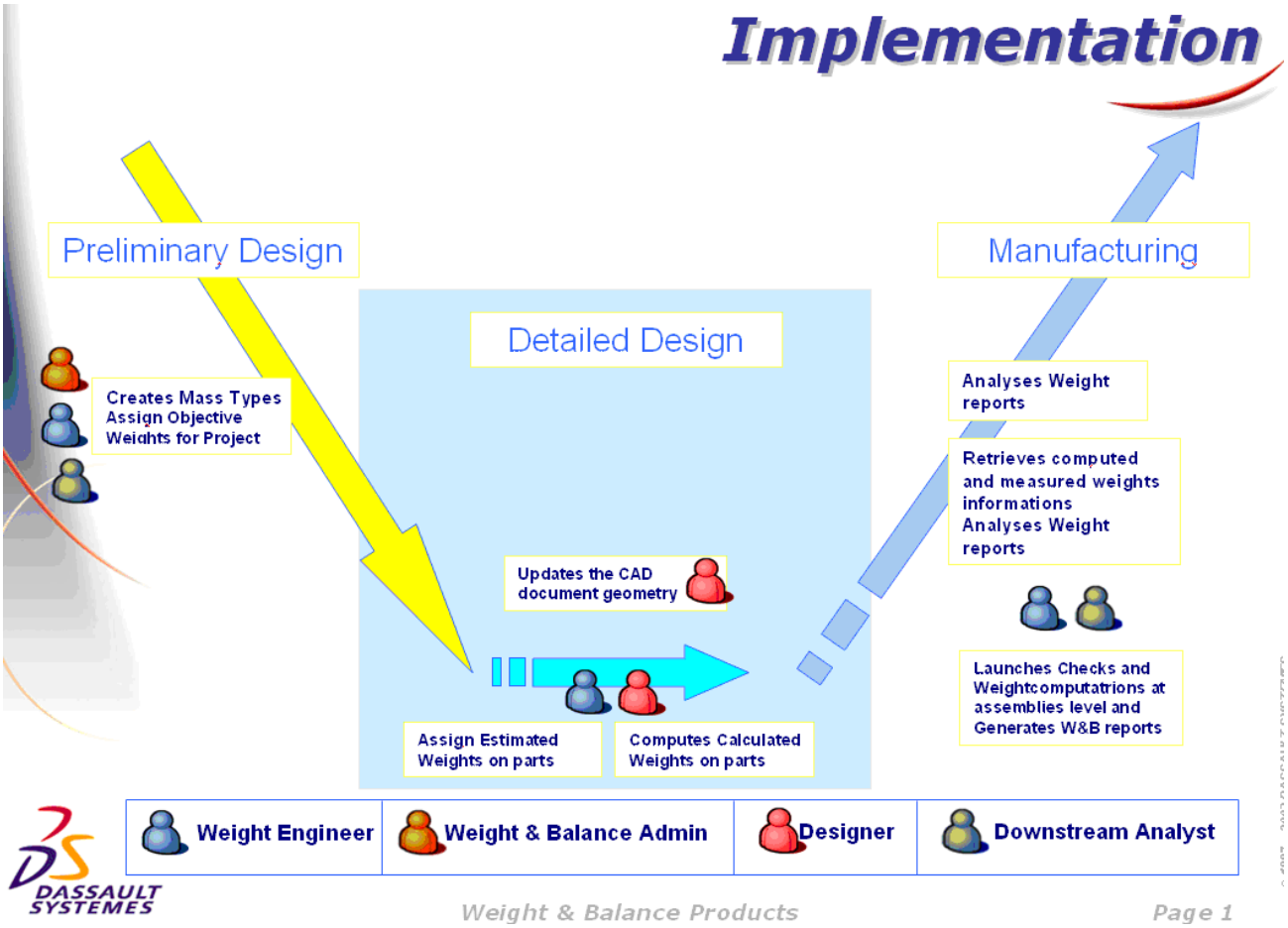
ENOVIA gives several possibilities to organize the product structure. But the better way to work in collaborative context with CATIA and ENOVIA is using a “User Specific Product Structure”. All designers work around their specific CATProduct.
A central product structure exists and is represented by a root CATProduct. This main product is used for design review or bill of materials generation for example.
Weight & Balance can generate reports on “User Specific Product Structure” or on the central product structure.

Weight & Balances stores the results of computation on the ENOVIA Part References and on the ENOVIA Document Revisions (optional). Only the Part References corresponding to leaves of the product may be considered as up to date or Document Revisions. Part References higher in the assembly are computed by summing the results of the children Part References. This does not severally impact the performances of the application since the expensive step in term of performance is to retrieve the MCI information from the CATDocument. Through an available W&B command, it is also possible to compute and generate reports for portions of the assembly.



People & Organization

User	Role	Responsibility
User1	Weight & Balance Administrator	Define settings according to company standards
User2	Weight Engineer	Provide MCI reports
User3	Designer	Create/Update CATDocuments
User4	Downstream Analyst	Use reports provided



The Weight & Balance user will have to analyze the Parts throughout the lifecycle of the product. Weight & Balance is able to analyze parts that may be locked by other users or that may be at the final stage in the lifecycle graphs. Weight&Balance is also able to override the ENOVIA security and update its own attributes on these parts. These changes can be made persistent in the database through the Weight&Balance Save command which will allow the user to commit the current ENOVIA session from cache to

database. To make sure that no other changes then the Weight & Balances attributes are modified, the appropriate mask and security processes should be applied for the role of the Weight & Balance user.

Step by step scenario

This chapter assigns an example to use the “Weight & Balance” BPA. Depending of customer’s data and process this scenario could be modified.

Project in early phase

A new project has started; a first version of the ENOVIA Product Root Class has been store in the database. The Weight Engineer has to provide an estimate of the weight on data and the assembly. For some of the parts, the geometry can be used (Computed Mass Type) but for some other an estimation is used from previous designs (Estimated Mass Type).

1. Launch VPM V5 and connect to ENOVIA
2. Open the PRC corresponding to the product to Analyze
3. Deploy the PRC in VPM V5 (no need to open in CATIA V5)
4. Retrieve the Weight & Balance toolbar available in the VPM V5 workbench
5. Using the W&B Part command, select the parts and apply the COMPUTED Mass Type as the active Mass Type. Apply the changes.
6. Using the W&B Part command, select the parts and apply the ESTIMATED Mass Type as the active Mass Type. Key in values for the mass, cg, moment and product of inertia. Apply the changes.

The results are computed for the whole assembly and reported.

7. Retrieve the Weight & Balance toolbar available in the VPM V5 workbench
8. Using the W&B Product command, choose the compute by active Mass Type option and select the compute button.
9. The results are displayed in a panel.
10. To generate the report, select the W&B Report command, choose the compute by active Mass Type.
11. Save the report and close the report panel.

Product definition advanced

During the project, the designers refine the definition of the parts and the Weight Engineer is asked to provide updated data. All the mass types are set to computed. The results are recomputed for the whole assembly in the database.

12. Retrieve the Weight & Balance toolbar available in the VPM V5 workbench
13. Using the W&B Part command, select the parts and apply the COMPUTED Mass Type as the active Mass Type. Apply the changes.
14. Using the W&B Product command, choose the compute by active Mass Type option and select the compute button.
15. The results are displayed in a panel.

16. To generate the report, select the W&B Report command, choose the compute by active Mass Type.
17. Save the report and close the report panel.

Project in production

At the end of the project, the product is produced and analyzed.
The components are measured and entered into WB (Measured MassType).
The results are recomputed for the whole assembly and saved in the database.

18. Retrieve the Weight & Balance toolbar available in the VPM V5 workbench
19. Using the W&B Part command, select the parts and apply the MEASURED Mass Type as the active Mass Type. Apply the changes.
20. Using the W&B Product command, choose the compute by active Mass Type option and select the compute button.
21. The results are displayed in a panel.
22. To generate the report, select the W&B Report command, choose the compute by active Mass Type.
23. Save the report and close the report panel.

General Remarks

Weight & Balance providing the master results:

When Weight & Balance in implemented in the company the results of the product should be used as the master results. Results computed through the available V5 Space Analysis functions differ not taking into account the settings defined by the Weight & Balance administrator which respect the company standards.