DASSAULT SYSTEMES

ENOVIA

# VOLUME COMPUTATION

## OBJECTIVE

**Volume Computation** provides the ability to create alternate representations of CATIA® **3D**EXPERIENCE® parts or assemblies in order to minimize the memory footprint of large assemblies or to securely exchange data without exposing all design details.

## OVERVIEW

**Volume Computation** creates accurate reduced representations of parts or assemblies by keeping their external representation only. Users can generate simplified representations of parts, ensuring confidentiality when communicating with suppliers. Further design is facilitated by performing space reservation through a swept or vibrating volume, which can also be used for clash detection. Finally, all generated representations can be managed easily by saving and reusing them for productive digital review and analysis.

**Volume Computation** enables the user to handle digital mock-ups of all sizes in industries as various as consumer goods, automotive, aerospace, energy, shipbuilding, or heavy machinery. It enables greater productivity for digital review and analysis with a comprehensive set of commands and unique set of functions to optimize the size and number of files that can be manipulated at any stage of the review.

Security of confidential intellectual property (IP) is protected by replacing geometrically accurate parts with simplified external representations. Users can create representations of products or assemblies, which are adapted to specific review tasks. **Volume Computation** enables users to perform potentially complicated and time-consuming verifications on products easily, and with fewer actions.

## HIGHLIGHTS

**Volume Computation** has the following key capabilities:

### Mesh Simplification for Lightweight Representations

Users can select a part or an assembly and simplify it through an additional tessellation in order to generate a light external envelope of the part or assembly. The extent of the simplification is user-controllable and the resulting representation is a unique volume. As such, users can easily manage the file size against the precision of the representation and thus drastically reduce the size of their assemblies. By providing instantaneous simplification, storage of any intermediate results is avoided.

### Simplified External Representations for Sensitive Data

Users can select a part or a set of parts and wrap it by applying an additional tessellation. This generates a lightweight external envelope of the selected part for situations where the outer aspect need not be identical to the original one. The user can protect confidential information by replacing accurate parts with a simplified representation when sending information to partners. Additionally, this feature can be used to drastically reduce the size of an assembly for improved productivity when reviewing a mock-up. The level of tessellation is selectable, enabling the user to manage file size against precision of the wrapped representation.

### Offsets for Applying Margins of Uncertainty

Users can select a part or a set of parts and enlarge it by computing a new outer tessellation. This generates an external envelope of the selected part for situations where one must apply a margin of uncertainty. With this functionality, the user can roughly reserve space for a component not completely designed yet. The value of offset (distance between the real shape skin and the new one) is selectable enabling the security margin management.

### Transform a Surface to a Solid

Styling or surface designers often specify thickness via an attribute. With **Volume Computation**, users can select the surface and transform it into a solid envelope with the thickness specified by a designer in order to reserve the space for interference detection.

### Silhouette to Simplify Review

Users can reduce the size of a part or an assembly by keeping only shapes that are seen from a set of viewpoints. This representation may be used to replace the real geometry when it is used as a context for a review or a design.

## Swept Volume Generation of a Moving Part

**Volume Computation** generates the swept volume of a moving part using a simulation defined by the user. This function allows the user to perform space reservation early in the process of assembly design, but also can be used for clash detection to ensure that a moving part will not come into contact with another part of the assembly at any time.

The number of pre-defined positions stored in the simulation can be reduced according to a controlled decrease of the final computation accuracy. This leads to a quicker computation and more lightweight representation of the swept volume. The swept volume function is fully integrated into the simulation environment; results are linked to simulation output. Thus, a change in the simulation parameters will be propagated to the associated swept volume representation.

## Vibration Volume Generation of a Vibrating Part

**Volume Computation** generates the vibration volume of a vibrating part using a motion defined by the user. This function allows the user to reserve space early in the process of assembly design, but also can be used for clash detection to ensure that a vibrating part will not come into contact with another part of the assembly at any time.

## Manage Different Representations for Productive Design Review and Analysis

The generated shapes are standard representations and are opened directly in the application window. They can be saved or exported as any other representation. The representations can be created immediately under the currently active product structure or can be created separately.

Depending on their needs, the user can perform usual digital review and analysis, either on the original shape or on one of its computed representations.

## Key Benefits:

- Generate lighter representations of parts/assemblies by simplifying meshes to a user-selectable level of accuracy.
- Generate simplified external representations of parts/assemblies, ensuring confidentiality protection when communicating with suppliers.
- Perform space reservation by generating a thickness for a surface or a security volume around a part.
- Create a light context by keeping only shapes that are seen from a set of viewpoints.
- Perform space reservation by generating the swept volume of a moving part or vibration volume of a vibrating part.
- Optimize digital mock-up management through the application of volume computation commands to meet the user's specific needs.

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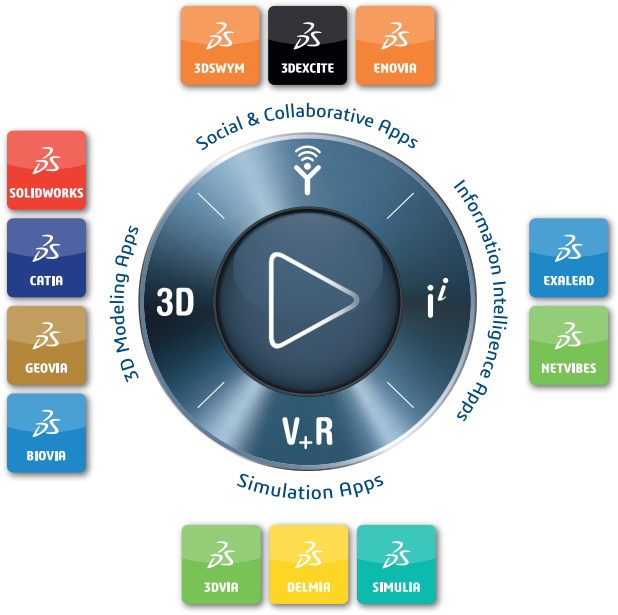


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