



3DXpert® for SOLIDWORKS®

Introducing 3DXpert for SOLIDWORKS Version 15

Facilitate Design for Additive Manufacturing (DfAM)

3DXpert® for SOLIDWORKS® is a complementary DfAM (Design for Additive Manufacturing) software for SOLIDWORKS, equipping designers and engineers with everything they need to prepare and optimize their designs for 3D printing. A click of a button in SOLIDWORKS brings native CAD data directly into 3DXpert® for SOLIDWORKS® and provides an extensive toolset to easily analyze, prepare and optimize designs for additive manufacturing (AM). Once completed, the ready for print data can be sent to any printer and back to SOLIDWORKS.



3DXpert for SOLIDWORKS enables you to:

- **Shorten Design Cycle** – bi-directional data exchange to easily reflect AM considerations as part of the design process
- **Easily ensure successful prints** – extensive automated toolset to analyze, prepare and simulate AM process before sending to print
- **Optimize design structure** – lightning fast creation, editing and viewing of lattice structures, resulting with lighter weights and enhanced functional properties

3DXpert for SOLIDWORKS 15 includes key new features and enhancements that bring new value to these objectives:



Shorten Design Cycle

Enhanced bi-directional direct data transfer with SOLIDWORKS



Optimize Design Structure

Enhanced lattice development suite



Easily Ensure Successful Prints

- Power Supports - New Automated Support Generation
- Enhanced Build Simulation Analysis

Key New Features & Enhancements

Shorten Design Cycle

Enhanced Bi-Directional Direct Data Transfer with SOLIDWORKS

Direct DfAM Interface

SOLIDWORKS is a leading CAD software for design of 3D models. While agnostic to the manufacturing scheme, both user's expertise and available design tool set, are oriented for traditional manufacturing techniques. When 3D printing is used for manufacturing, a special DfAM (Design for Additive Manufacturing) software should be used to ensure successful prints and to get the most out of AM capabilities. To use the DfAM software, the model has to be exported from SOLIDWORKS and when it is ready for print, it should be read back into SOLIDWORKS for documentation and verification.

Challenge : Transferring data to and from SOLIDWORKS to the DfAM software might be a time consuming process involving format conversion and hence downgrading design integrity.

Solution : Seamless bi-directional data transfer with a click of a button within SOLIDWORKS, maintains design integrity and reflects DfAM modifications back in SOLIDWORKS.

From SOLIDWORKS to 3DXpert

A button click in SOLIDWORKS opens a new 3DXpert for SOLIDWORKS session. The CAD model is automatically loaded and placed on the build plate, enabling the user to continue working with native CAD data without using data conversion tools. Data integrity is maintained including analytic geometry, part topology, and color coding.

The DfAM Process

Design for AM includes several steps:

- **Analyze** – run printability check, making sure the model can be printed (e.g. size, wall thickness)
- **Modify** – changes to the model required to facilitate operations that are performed after the printing (e.g. adding material to be removed during post processing, shutting of holes to be drilled).

- **Orient** – place and orient the part on the build plate while optimally meeting pre-defined criteria (e.g. surface quality, print time, material usage, amount of supports)
- **Support** – set support structures as needed to ensure successful prints
- **Optimize** – use volume and surface lattice structures to enhance the functional properties of the part
- **Arrange** – arrange the parts on the build plate for best utilization of the print volume

From 3DXpert to SOLIDWORKS

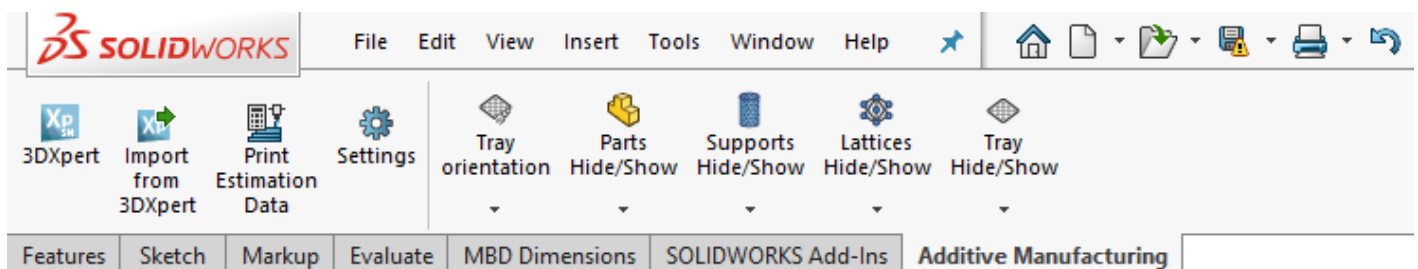
After completing all these steps using 3DXpert for SOLIDWORKS, the model can be sent directly to print using any printer of your choice. You may also bring the ready-to-print model back into SOLIDWORKS.

You can then run functional analysis and simulation within SOLIDWORKS, document the model to be printed and send it to print from SOLIDWORKS.

Design with AM in Mind

The enhanced data interface allows more data to flow from 3DXpert to SOLIDWORKS. These enhancements include:

- **Print Estimation Data** – an estimation of the printing time, material consumption, and cost.
- **Tray Orientation** – capturing the parts orientation in relation to the tray and switching between viewing the model from the original part orientation or from that of the tray
- **Managing the hide/show of different types of printed objects** – hide and show lattices, support structures, the printed part model, and the tray.



SOLIDWORKS Additive Manufacturing ribbon - '3DXpert' button exports the CAD data to 3DXpert for SOLIDWORKS session. 'Import from 3DXpert' button imports the data back into SOLIDWORKS

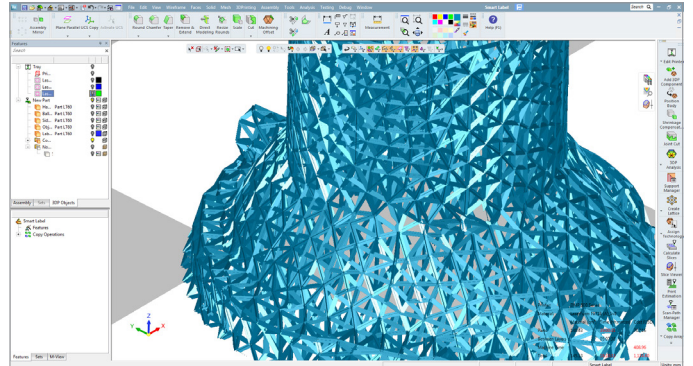
Optimize Design Structure

New Lattice Design Freedom Gain an Unmatched Competitive Edge

Lattice structures are a commonly-used strategy for lowering the weight of a part, enhancing its functional properties while maintaining its outer shape, or adding texture to its outer faces. In addition to using the existing rich library of predefined lattice structures in 3DXpert, developing your own structures is a great way to gain a competitive edge, optimize manufacturing costs, and capitalize on your own IP and gained experience.

Challenge : How to have full control over lattice structures to address specific functional or manufacturing challenges optimally.

Solution : 3DXpert for SOLIDWORKS' lattice design has revolutionized the speed at which you can generate and manufacture lattices. The new lattice design development features offer tools and options to gain control over lattice structures and textures and alter them for best results.



New zero-thickness struts fill object with open faces allowing for lower weight and faster printing

Volume and Surface Lattice

- Enhanced editing and control functionality enables you to move, add or remove a specific lattice element, and optimize and fine tune lattice designs to best suite your needs.
- Catalog-based lattice cells provide new design flexibility. Use complex and accurate lattice cell shapes, control the actual dimensions of features in cells based on b-rep geometry and form catalogs of sizes with preset dimensions.
- Zero thickness struts of lattice cells enable you to print with a single laser path with much faster slicing and printing.
- Apply uneven or rough lattice structures to part of a volume lattice that is left exposed. For example, medical professionals often prefer these areas to have rough, open faces.
- Surface lattices now enjoy the full lattice design freedom of volume lattices. You may use any cell structure defined and used in volume lattice including user-defined cells and have them conform to the shape of your part and form complex textures.
- A new option for texture design enables you to use images as the basis for textures that are spread on the faces of the part.

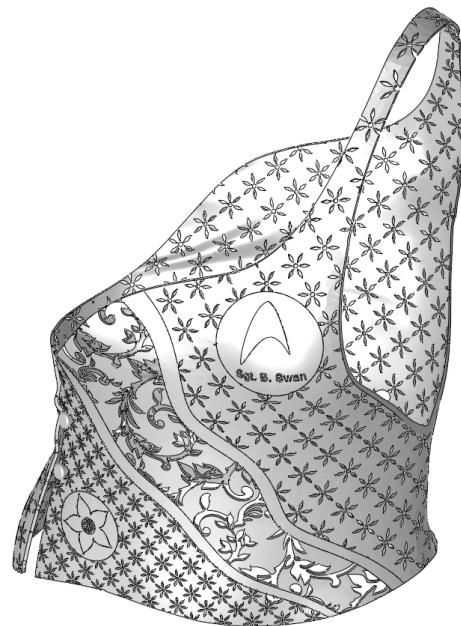


Image based Textures

Easily Ensure Successful Prints

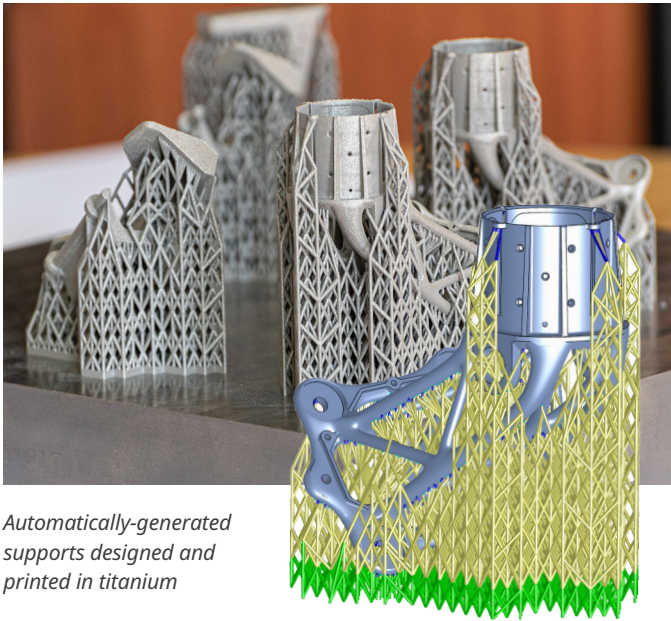
New Automated Support Generation Shorten Preparation Time and Reduce Manufacturing Costs

Many printing technologies require support generation, which can be a tedious and time-consuming task. Correct support setting has a significant impact on print success, surface quality, and post-processing time and cost.

Automating the generation of supports is a challenging task as you must take many considerations into account.

Challenge : Generating adequate support structures and place them correctly is a time consuming task requiring special expertise.

Solution : The new power supports feature allows full automation of the support generation process for different geometries with a click of a button, based on a set of pre-defined parameters per material. Lattice-like or tree-like supports grow from the part geometry down to the build plate in a click of a button. The new support structures require less material and are much easier to remove. The support structure automatically keeps its distance from the part geometry to ease its removal while gusset connections are used to shorten connector length where required.



Automatically-generated supports designed and printed in titanium

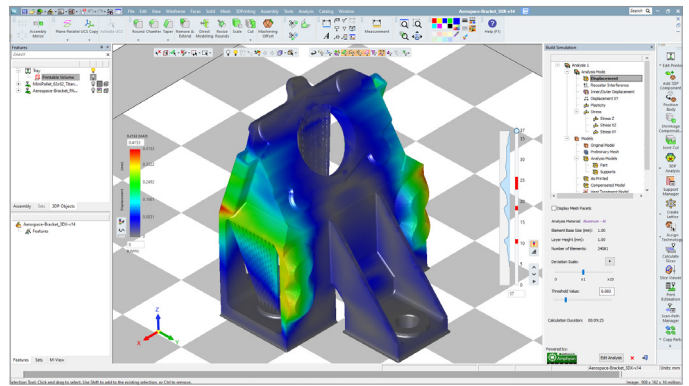
Enhanced Build Simulation Analysis Clearer Visualization of Simulation Results

Build simulation ensures a successful print that meets the model specifications, helps the user optimize the design, and minimizes the number of tryouts. Integrated within the design environment, build simulation provides designers with immediate feedback on their design decisions including orientation, number of supports (both too few and too many), and part printability. This is of particular importance when printing costly or large-volume parts.

Challenge : Simulation results might be hard to understand and link to appropriate corrective actions.

Solution : Enhanced visualization of build simulation analysis results accompanied with a new set of tools make it easier and simpler to find and focus on relevant simulation results:

- New histograms along with a graph of actual analysis results for each layer enable you to focus easily on the build layers that have deviated from a user-defined threshold.
- Magnifying small displacements and animating the change from the original state to the displaced state enable easier identification of those displacements.
- A new analysis clearly shows whether displacement adds or removes material.
- Separating the stress to its elements (Z associated with tensile stress and XZ and XY associated with shear stress) enables you to determine more easily the appropriate corrective action.



New histogram and legend showing in which layers and in what intensity different criteria are met



Find out more at: <https://www.3dsystems.com/3DXpert4SW>

3D Systems provides comprehensive 3D products and services, including 3D printers, print materials, on-demand parts services and digital design tools. Its ecosystem supports advanced applications from the product design shop to the factory floor to the operating room. As the originator of 3D printing and a shaper of future 3D solutions, 3D Systems has spent its 30 year history enabling professionals and companies to optimize their designs, transform their workflows, bring innovative products to market and drive new business models. Specifications subject to change without notice. 3D Systems, the 3D Systems Logo, 3DXpert and the 3DXpert logo are trademarks of 3D Systems, Inc. All other trademarks are the property of their respective owners.