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1. V-Flash® Print Preview Tutorial & Tips

The V-Flash® Tutorial will guide the user through the different aspects when using Print Preview for printing a part. Additionally, some of the 'best practices' developed at 3D Systems are presented so that the user can get the best quality and reliability from their V-Flash® system.

Note that while many part geometries are covered in the tutorial, a user may encounter a part with a geometry that can still cause a part defect or issue.

3D Systems encourages each user to contact 3D Systems to see if a solution can be found for that particular part. It is the intent of 3D Systems to work with each V-Flash® user to collaborate on any issues to make using V-Flash® a successful user experience.

Click on the appropriate tutorial below to guide you through the instructions, tips and parts information.

[General Part Build](#)

[Part Set Up Tips](#)

[Part Defect Prevention Tips](#)

[STL File Issues](#)



Video clips are available in the tutorial that will show you the functions of print preview and how to manipulate the parts on the build platform.

[Return to V-Flash® Print Preview Tutorial Contents](#)

2. General Part Build

The purpose of the General Part Build Tutorial is to guide the user through the basic Print Preview build setup for printing a part. The user will review the following steps:

- 1- Open Print Preview
- 2- Load part file (STL)
- 3- Select part
- 4- Center part
- 5- Rotate Part- Suggest rotating 5-degrees to X or Y axis for parts with flat surface parrallel to build pad.
- 6- Check estimated time to build part- Note this is an estimate
- 7- Check part Information- Note this is an estimate
- 8- Preview support placement; more detail on this topic using link below.
- 9- Create build file

Click on the link below to view a video of how to load and create a part build using the Print Preview software on the V-Flash® system.



[General Part Build](#)

[How to Preview Supports](#)

[Return to V-Flash® Print Preview Tutorial Contents](#)

How to Preview Supports

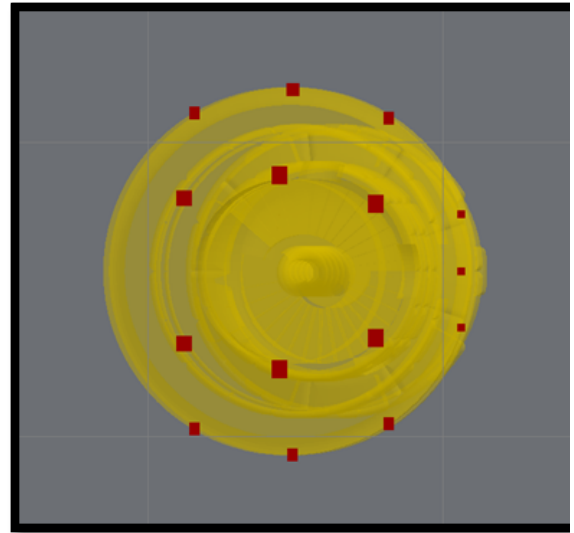
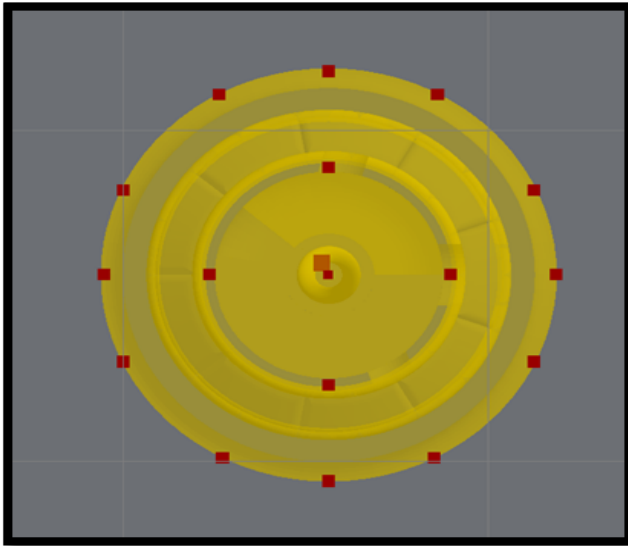
How to Preview Supports is a guide to the user through the basic Print Preview support generation for printing a part. The user will be able to view the supports that will be used in the build to verify the preferred part orientation.

Advantages preferred would be:

- Fewer supports on part
- Larger supports on small parts for reliability
- Support placement relative to part details
- Support placement on matching parts

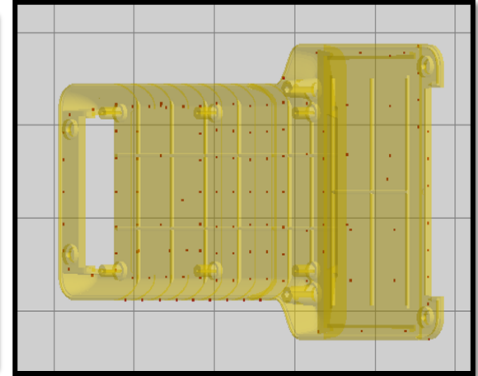
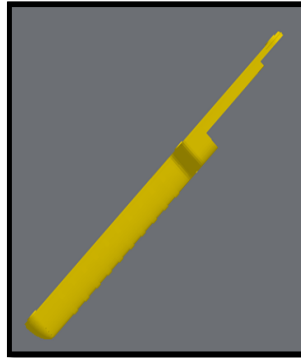
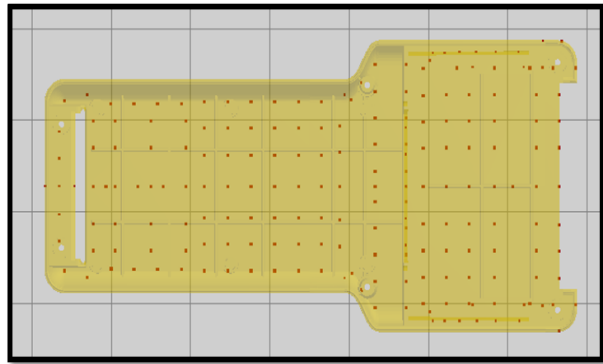
Click on the link below to view a video of how to create and view the supports on a part build using the Print Preview software on the V-Flash® system.

Example of Fewer Supports on Cover Part



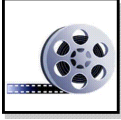
Note both fewer and larger supports when part was rotated 5-degrees about the Y-axis

These images show the advantages of gaining fewer supports by rotating the part relative to the Y-axis. The image printed flat will have more supports. The image at 45-degree will have fewer supports. Note the part at 45-degrees will also have a longer build time. It will also have shorter post process time due to fewer supports. The user must determine the best value in time versus support versus part post processing.



3. Part Build & Tips

The purpose of the Part Build & Tips Tutorial is to educate the user through basic Print Preview build setup practices. The tips listed under Part Build & Tip will demonstrate how to manipulate parts in Print Preview. Additionally, the user will learn how to save changes to both individual parts and an entire build platform consisting of many parts.



Click on the link below to view the desired video of how to better use the Print Preview software on the V-Flash® system.

- [Scale Part to Custom Size](#)
- [Make One or More Copies of a Part](#)
- [Save a Part](#)
- [Save Platform of Parts](#)
- [Multiple Part Platforms](#)
- [Tips for Building Detail Parts](#)
- [Tips for Building Small Parts](#)

[Return to V-Flash® Print Preview Tutorial Contents](#)

Make One or More Copies of a Part

The purpose of the Copy function in Print Preview is to allow for the user to make multiple copies of any given part present on a platform.
Note: The part may be scaled or rotated into a desired position before making one or more copies.

The following steps are used to make one or more copies of a part :

- 1- Select the part
- 2- Reorient the part(s) for the optimal build layout
- 3- Select the Copy function in Print Preview
- 4- Choose how many copies to make



Click on the link below to view the desired video of how to better use the Print Preview software on the V-Flash® system.

[Make One or More Copies of a Part file](#)

[Return to Part Build & Tips](#)

Multiple Part Platforms

When submitting multiple parts for a build in Print Preview, the parts can be oriented to be optimized for build quality and reliability.

The following are tips for orienting parts on a platform for a successful build:

1- Group part closer to the center of the platform

2- Place part ~0.5inches a part.

Note: Parts left overlapping in a build will be built together as one part.

3- Long parts build best on X-axis

4- Tall Parts build best closer to center of platform



Click on the appropriate link below to view the how to better use the Print Preview software on the V-Flash® system.

[Tips for Multiple Parts on Platform](#)

[Tips to Orient Long Parts](#)

[Tips to Orient Tall Parts](#)

[Return to Part Build & Tips](#)

Save a Part

The purpose of the function to **Save a Part** on a Platform in Print Preview is to allow for the user to save any given part once it has been manipulated for size and/or position.

Once the part(s) has been saved, the next time it is submitted into the platform it will submit in the saved orientation. The part is saved as an STL file.

The following steps are used to save a part on the platform:

- 1- Select the part
- 2- Reorient the part for the optimal build platform- Suggest rotating 5-degrees to X or Y axis for parts with flat surface parallel to build pad.
- 3- Click the Save Part As function
- 4- Save part file(s)



Click on the link below to view the desired video of how to better use the Print Preview software on the V-Flash® system.

[Save a Part](#)

[Return to Part Build & Tips](#)

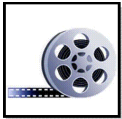
Save Platform of Parts

The purpose of the function to **Save Platform of Parts** in Print Preview is to allow for the user to save any given platform of parts in a desired layout once they have been manipulated for size and/or position.

Once the platform has been saved, the next time it is submitted into the platform it will submit in the saved orientation. The platform of parts is saved as a CTL file.

The following steps are used to save a platform of parts:

- 1- Select each part
- 2- Reorient each part for the optimal build platform- Suggest rotating 5-degrees to X or Y axis for parts with flat surface parallel to build pad
- 3- Save platform as a CTL



Click on the link below to view the video of how to better use the Print Preview software on the V-Flash® system.

[Save a Platform of Parts](#)

[Return to Part Build & Tips](#)

Scale Part to Custom Size

The purpose of the Scale function in Print Preview is made available so that a user can scale a part to either fit into the V-Flash® build area or to scale a part to a custom size. Each part within a platform may be scaled to a different custom size.

When a part is loaded into Print Preview the user may be prompted for inches or millimeter units. Once the choice is made the part's extents may still be too large for the V-Flash® platform.

This can be resolved by changing the part extents size using the scaling function. The following steps are used to scale a part:

- 1- Load part file
- 2- Choose units
- 3- Move part onto platform
- 4- Choose Scale function in Print Preview

Click on the link below to view the video of how to scale a part to a custom size using the Print Preview software on the V-Flash® system.

[Scale Part to Custom Size](#)

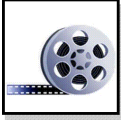
[Return to Part Build & Tips](#)

Tips for Building Detail Parts

When submitting detailed parts for a build in Print Preview, the parts can be oriented to be optimized for build quality and reliability.

Highly detailed parts build best when placed near the center of the platform.

If the platform has multiple parts with high detail, it is best to build these together as opposed to combining it with a large flat part together with a detail part. Once parts are arranged as desired, run Generate & Preview Supports in Print Preview to verify support placement.



Click on the appropriate link below to view how to better use the Print Preview software on the V-Flash® system.

[Tips for Building Detail Mixed Size Parts](#)

[Tips for Building Detail Single Part](#)

[Return to Part Build & Tips](#)

Tips for Building Small Parts

When submitting small parts for a build in Print Preview, the parts can be oriented to be optimized for build quality and reliability.

Rotating the flat surface of the part that is parallel to the build platform to be 5-degrees in either the X or Y axis improves reliability and quality of the part.

When building multiple parts on the platform, some parts may be much smaller than others on the platform. It is best to place the smaller parts closer to the center of the platform rather than push them out to the corners.

If the platform has all small parts, it is best to build these closer to the center rather than the edges of the build platform. Once parts are arranged as desired, run Generate & Preview Supports in Print Preview to verify support placement.



Click on the appropriate link below to view the how to better use the Print Preview software on the V-Flash® system.

[Tips for Building Small Mixed Size Parts](#)

[Tips for Building Small Similar Size Parts](#)

[Return to Part Build & Tips](#)

4. Part Defect Prevention Tips

The Part Defect Prevention Tips tutorial is necessary to help educate the User through geometry specific Print Preview STL setup practices. These tips list under Part Defect Prevention Tips will show the user how to manipulate the STL part or a platform of multiple STL parts in Print Preview. In addition, the tips will educate the user on how to prevent part defects as a result of the given geometry based on best practices from 3D Systems.



Click on the link below to view the desired video of how to better use the Print Preview software on the V-Flash® system.

- [Optimize Large Surface Area Offset](#)
- [Large Area Offset Example](#)
- [Optimize Parts with Multiple Holes](#)
- [Multi. Hole Defect Example](#)
- [Optimize for Large Part Shrink](#)
- [Optimize Thin Wall Parts and Scaling](#)
- [Optimize Hollow Tube Parts](#)
- [Parts Built to Assemble](#)

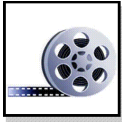
[Return to V-Flash® Print Preview Tutorial Contents](#)

Optimize Hollow Tube Parts

When loading part files onto a platform in Print Preview, some orientation choices can be made to optimize the build quality and reliability. A part that has a long hollow tube feature can be optimized to resolve the tube as a round cylinder and for reliability of the build.

When orienting the part in print Preview the part should be placed at either vertical or at a 20-degree angle for the best outcome. Once parts are arranged as desired, run Generate & Preview Supports in Print Preview to verify support placement.

Click on the link below to view the desired video of how to better use the Print Preview software on the V-Flash® system.



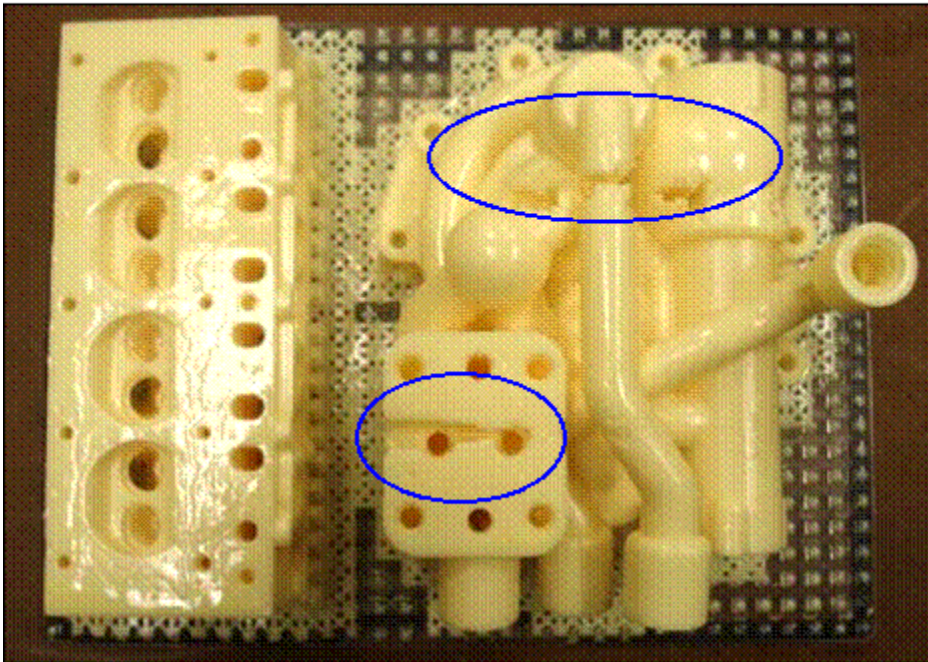
Click on the link below to view the desired video of how to better use the Print Preview software on the V-Flash® system.

[Optimize Hollow Tube Parts](#)

[Return to Part Defect Prevention Tips](#)

Multi. Hole Defect Example

The defects seen on this part is a result of having multiple holes in a large flat surface. See previous slide to view videos that show how to minimize this chance of defect in a build.



[Return to Part Defect Prevention Tips](#)

Optimize for Large Part Shrink

When loading parts onto a platform in Print Preview, some orientation choices can be made to optimize the build quality and reliability. A long flat part may be subject to bow due to part shrinkage.

To reduce shrinkage the part file may be oriented such that it will use the part geometry for additional strength. In addition, it is best to post process parts soon after building to reduce the time for shrinkage.



Click on the link below to view the desired video of how to better use the Print Preview software on the V-Flash® system.

[Optimize for Large Part Shrink](#)

[Return to Part Defect Prevention Tips](#)

Optimize Large Surface Area Offset

When loading parts onto a platform in Print Preview, some orientation choices can be made to optimize the build quality and reliability.

One example is building a tall and/or thin part. It is best not to add a part with large flats. The large flat surfaces may cause an offset in the wall of the thin part. To prevent this from happening, build tall thin parts together and build the large flat parts in a separate build whenever possible. If not, then try and rotate the large flat surface that is parallel to the build pad 5-degrees to X or Y axis.

Some parts contain their own large flat surfaces that may cause an offset within the part during a build. This can be prevented by building the part at an angle. The angle will remove the large flat surfaces from build layers. A 5-degree angle as mentioned above is a suggested angle to start with. Once parts are arranged as desired, run Generate & Preview Supports in Print Preview to verify support placement.

Click on the link below to view the desired video of how to better use the Print Preview software on the V-Flash © system.



Click on the link below to view the desired video and example of large surface area offset.

[Optimize Large Area Offset Mixed Parts](#)

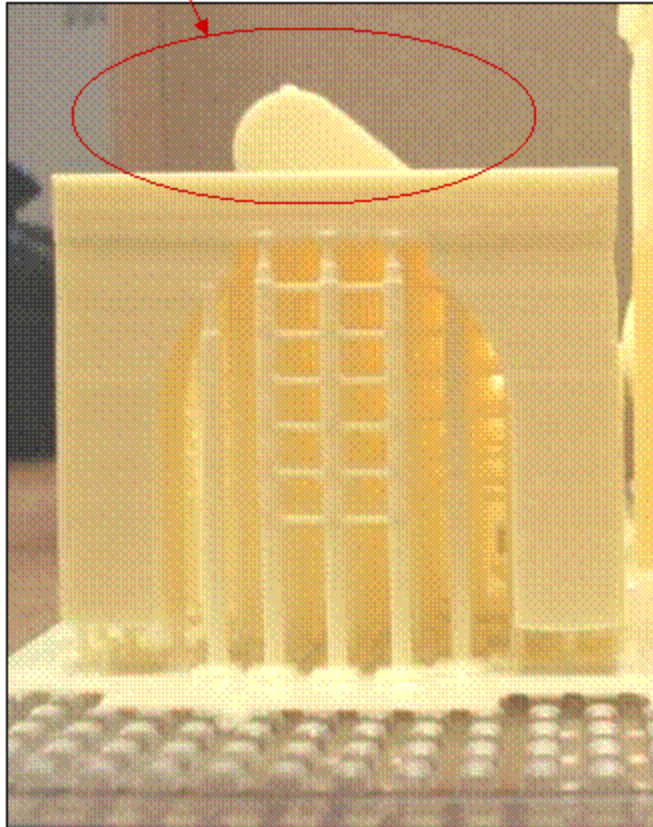
[Optimize Large Area Offset Single Part](#)

[Large Area Offset Example](#)

[Return to Part Defect Prevention Tips](#)

Large Area Offset Example

The offset shown is what can happen with a large offset area. The wall should be flat facing out of the page. Angling this part 10 to 15 degrees may reduce the offset.

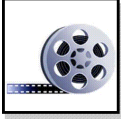


[Return to Part Defect Prevention Tips](#)

Optimize Parts with Multiple Holes

When loading parts onto a platform in Print Preview, some orientation choices can be made to optimize the build quality and reliability. A part may contain small holes that could cause the part to drip material onto the image plane glass. This may cause a defect in the final part.

To prevent the holes from causing this issue, the part file may need to be oriented at an angle to prevent any material buildup. A suggested starting angle would be to rotate the large flat surface that is parallel to the build pad 5-degrees to X or Y axis. Once parts are arranged as desired, run Generate & Preview Supports in Print Preview to verify support placement.



[Click on the link below to view the desired video of how to better use the Print Preview software on the V-Flash® system.](#)

[Optimize Part with Multiple Holes](#)

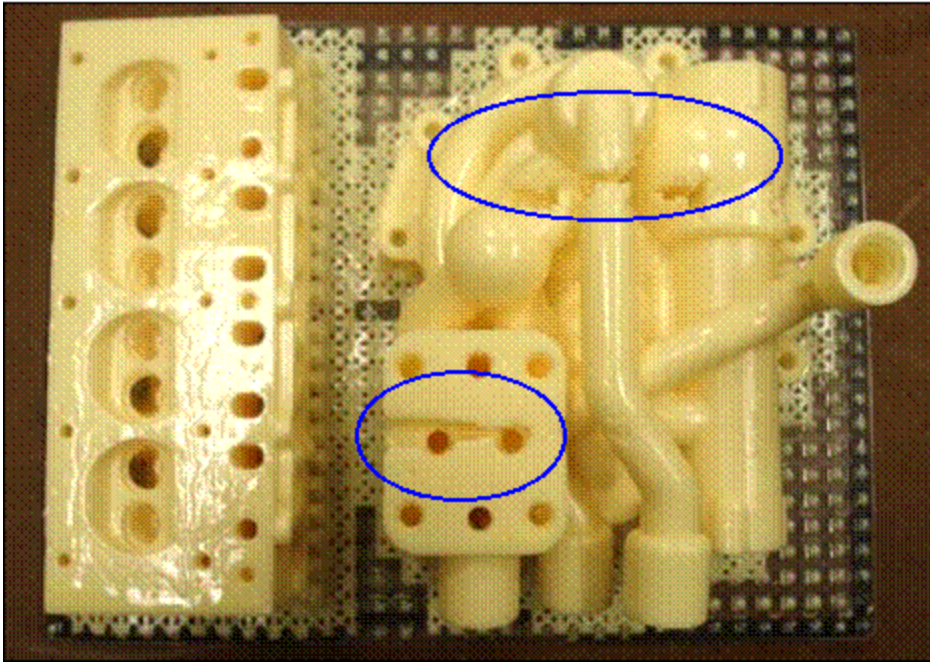
Click on the link below to view the example of multiple holes defect.

[Example of Multiple Hole Defect](#)

[Return to Part Defect Prevention Tips](#)

Example of Multiple Hole Defect

The defects seen on this part is a result of having multiple holes in a large flat surface. See previous slide to view videos that show how to minimize this chance of defect in a build.



[Return to Part Defect Prevention Tips](#)

Optimize Thin Wall Parts and Scaling

The V-Flash® system will build vertical thin walls as small as 25mil on the original part loaded into Print Preview. If a vertical wall on the originally loaded part is smaller than 25mil thick, that wall will be boosted to 25mil thickness.

However, when scaling parts after loading into Print Preview, the vertical or non-vertical walls can become less than 25mil. These walls may not build reliably on the system. It is best to go back to the STL file and see if it can be modified to match the system capability.

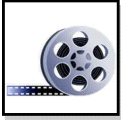
For example; a part file has a sheet metal wall thickness of 40mil and is loaded into Print preview. If the part is scaled to 25%, then the wall thickness will only be 10mil. This will not build reliably as the wall is now thinner than the 25mil limit.

[Return to Part Defect Prevention Tips](#)

Parts Built to Assemble

When loading part files that are to be assembled after building onto a platform in Print Preview, some orientation choices can be made to optimize the part quality and fit. Some of these parts may be built on the same platform and some may need to be built in separate builds based on the size of the parts.

When orienting the part in print Preview the part should be placed to run on the same axis for the best outcome. If parts built separately, the parts should be placed in the same area of the build pad where possible. Once parts are arranged as desired, run Generate & Preview Supports in Print Preview to verify support placement.



Click on the link below to view the desired video of how to better use the Print Preview software on the V-Flash® system.

[Parts Built To Assemble](#)

[Return to Part Defect Prevention Tips](#)

5. STL File Issues

While the V-Flash® does have some capability to verify and make minor improvements to STL files, it is not a full scale CAD program. Thus, the user must verify that when attempting to build "digitally scanned" files or CAD assemblies that the STL is clean before sending to V-Flash® for a quality part build. A clean STL file is described as not having inverted triangles, floating shells, walls of no thickness, triangle holes, or other artifacts.

The following list is of ways an STL file can be made 'bad' before being submitted:

- STL was created with a three dimensional scanner (i.e. - digitally scanned). The scanned file data may not form a clean STL without manual manipulation of triangles. STL is an assembly of parts.
- If the assembly of parts are not joined as a single part, Print Preview will apply extra supports so that each individual piece of the assembly is adequately supported. The resulting part is "over-supported".3- STL file is a conversion file. An STL can be made from converting 3D Sketch files to STL files (i.e. - Google Sketch, etc.). However, unless manual manipulation of wall thickness and triangles, the part can have build issues.

Click on the links below to view examples of STL file issues.

[Scan STL Issue](#)

[Assembly of Parts](#)

[Conversion Files](#)

[Preview Supports on Questionable Files](#)

[Return to V-Flash® Print Preview Tutorial Contents](#)

Assembly of Parts

An STL file can be made from an assembly of parts using various CAD programs, scan systems, or file conversion systems. Sometimes when using these methods the assembly is created as a single STL consisting of a system of parts rather than a single solid STL. This may cause the STL file to not be clean for submitting and building a quality part.

This does not mean the V-Flash® will not run an STL from an assembly of parts. However, the user needs to be aware of potential issues within the assembly of parts that may need to be repaired before sending the part to prevent defects in the finished part.

Some of the things in the data that will cause build issues are:

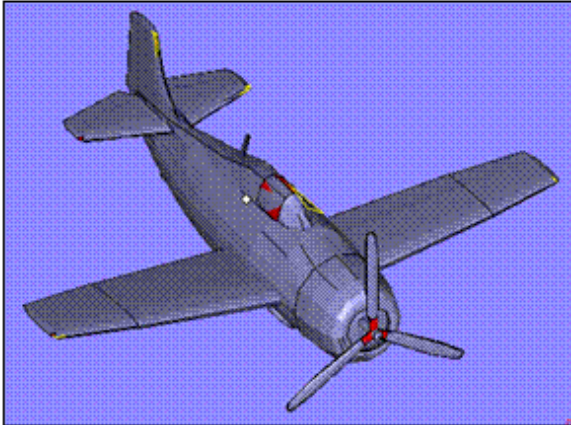
- 1- Print Preview will apply extra supports so that each individual piece of the assembly is adequately supported. The resulting part is "over-supported".
- 2- Parts of the assembly may be surfaces causing supports to go thru the part and extend above the top of the part.

Click on the link below to view examples of 'bad' STL files due to assembly of parts.

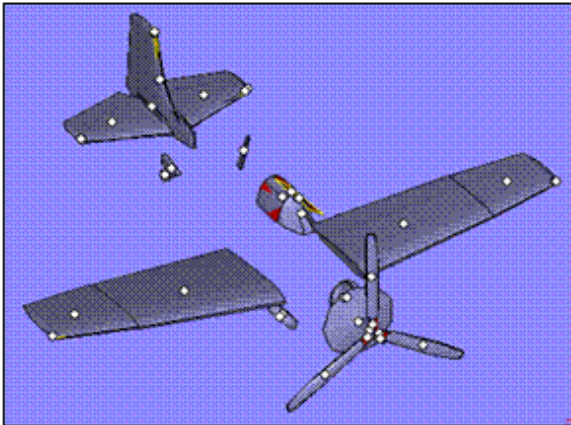
[Assembly of Parts Example](#)

[Return to STL File Issues](#)

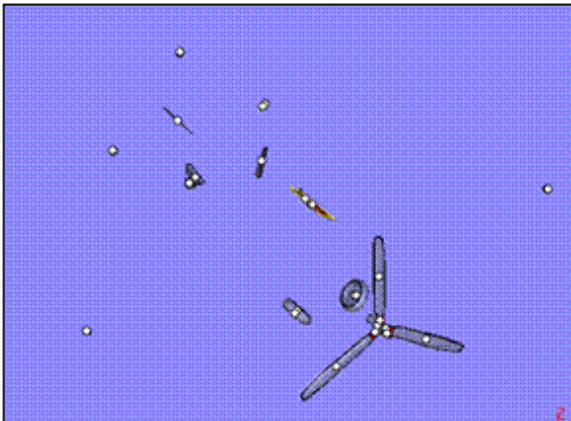
Assembly of Parts Example



Images show multiple parts to an assembly that are not connected. This will cause support structures to build thru some assembly parts to get to others. Meaning supports will be throughout the part in non-desirable places.



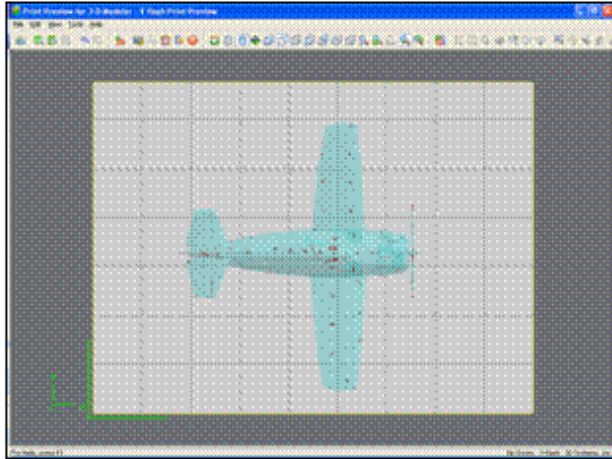
Note all of these parts are separate parts from main body of plane. These will all have independent support structures.



These parts are all floating or noise shells that will also be independently supported.

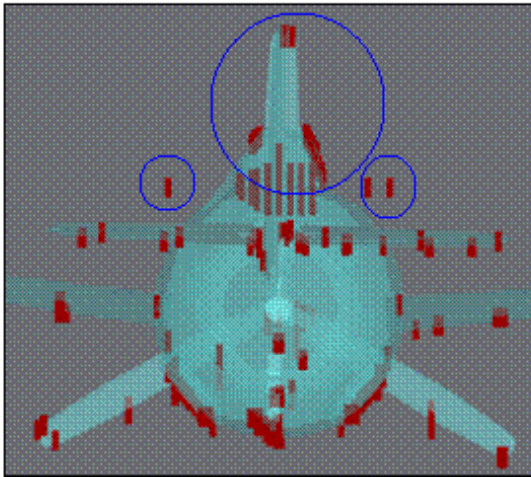
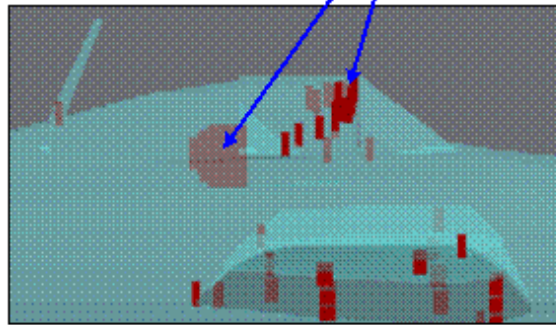
To see the supports, click on Preview Supports Function

Preview Supports Function



After running the Generate and Preview Supports function in Print Preview, the support errors are shown in the given images.

Note the holes in the cockpit area. These are not in the original STL file, but are inverted/overlapping triangles in the STL. This will NOT build clean. Also note the supports on top of the cockpit area.

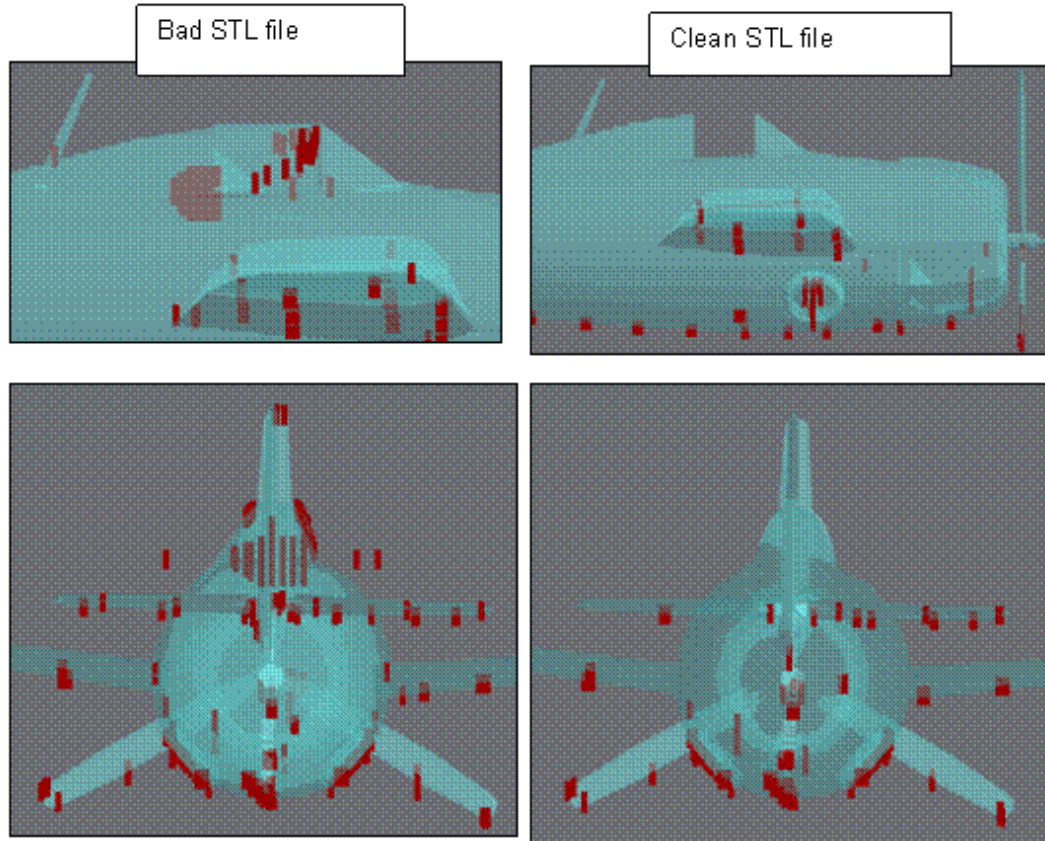


Note the floating or noise shell supports. In addition, there are many supports on top on the part.

[Click on the link to see Clean STL and Bad STL Files](#)

See Clean STL and Bad STL Files

After running the Generate and Preview Supports function in Print Preview, the support errors are shown fixed in the given images.



[Return to STL File Issues](#)

Conversion Files

STL files can be created by converting 3D Sketch files in software such as Google Sketch. Without manual manipulation of wall thickness and triangles, the part can have build issues. Sometimes when using these methods the STL is composed of very thin walls and random or noise shells. This may cause the STL file to not be ready for submitting and building a quality part.

This does not mean the V-Flash® will not run an STL from a conversion file. However, the user needs to be aware of potential issues within the STL that may need to be repaired before sending the part to prevent defects in the finished part.

Some of the things in the data that will cause build issues are:

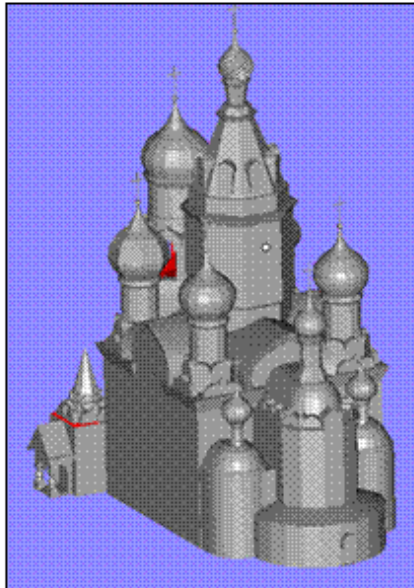
- 1- Very thin walls such that there is no wall thickness.
- 2- Assembly of multiple parts.
- 3- Small 'noise' shells are created that cause random supports in build.
- 4- Inverted triangles in part cause 'holes' in part.
- 5- Hollow parts can be created to have triangles above the part itself.

Click on the link below to view examples of 'bad' STL files due to assembly of parts.

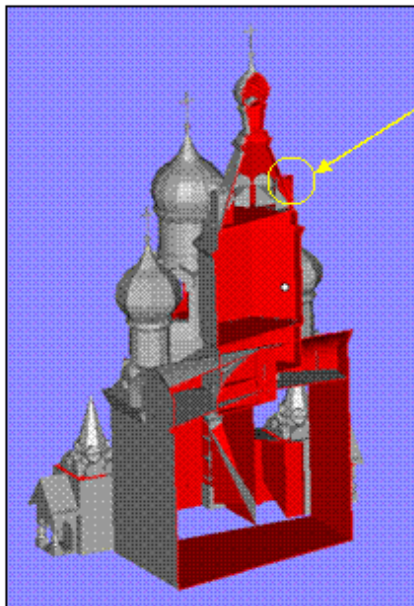
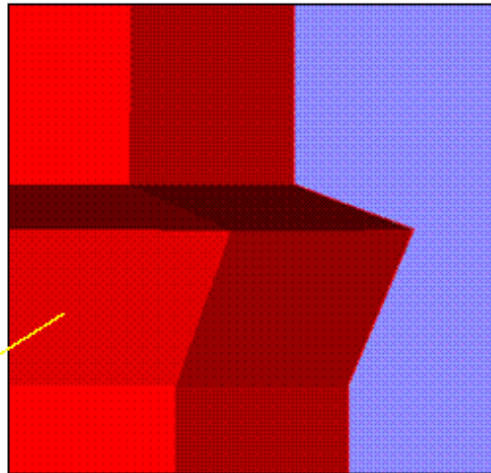
[Conversion File Issue Example](#)

[Return to STL File Issues](#)

Conversion File Issue Example



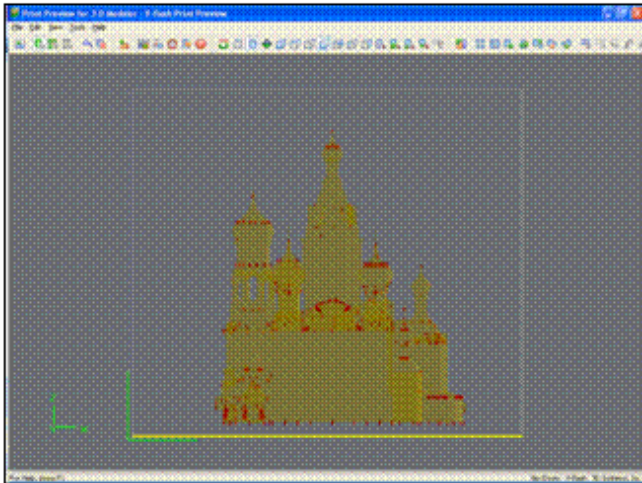
The church part is shown after being converted from a Google Sketch File to an STL. The part has many inverted and overlapping triangles. Also, shown below is the issue of the thin wall with no thickness.



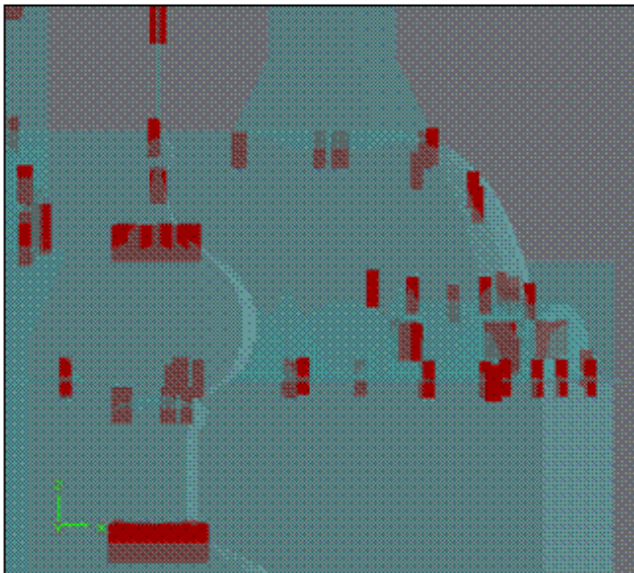
Scan file converted from Google Sketch shows the walls to be of no thickness. This means the surface shown in RED is only a surface line. Supports will build thru these parts.

[Click on the link to view Conversion File Support Issues](#)

Conversion File Support Issues

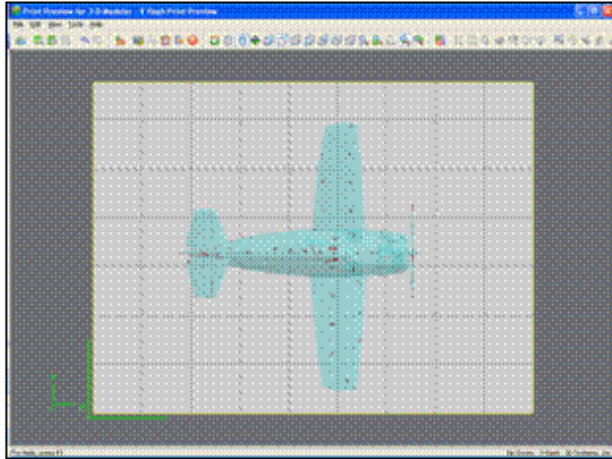


After running the Generate and Preview Supports function in Print Preview, the support errors are shown in the given images.



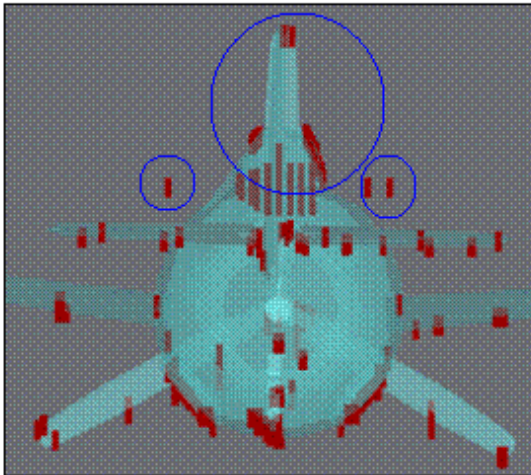
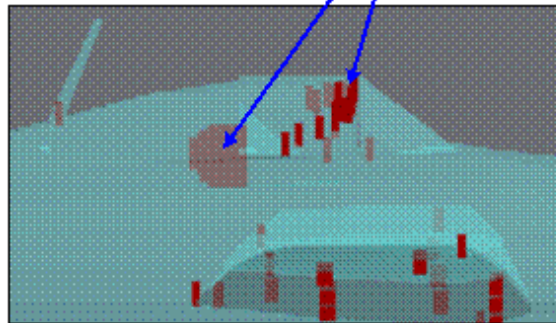
Note the supports coming through the top of the part. This is due to thin or no thickness walls. This part would need to be manually fixed in another CAD software before building correctly.

Preview Supports on Questionable Files



After running the Generate and Preview Supports function in Print Preview, the support errors are shown in the given images.

Note the holes in the cockpit area. These are not in the original STL file, but are inverted/overlapping triangles in the STL. This will NOT build clean. Also note the supports on top of the cockpit area.



Note the floating or noise shell supports. In addition, there are many supports on top on the part.

[Return to STL File Issues](#)

Scan STL Issue

When using a system to scan a part in order to create an STL, sometimes the data does not convert very well to create a clean STL file. Manual manipulation of the resulting STL file is the only way to ensure quality part building.

This does not mean the V-Flash® will not run scanned parts. However, the user needs to be aware of potential issues within the scan data itself that may need to be repaired before sending the part to prevent defects in the finished part.

Some of the things in the data that will cause build issues are: Assembly of multiple parts.
Small 'noise' shells are created that cause random supports in the build.
Inverted triangles in part cause 'holes' in the part.
Hollow parts can be created to have triangles above the part itself.

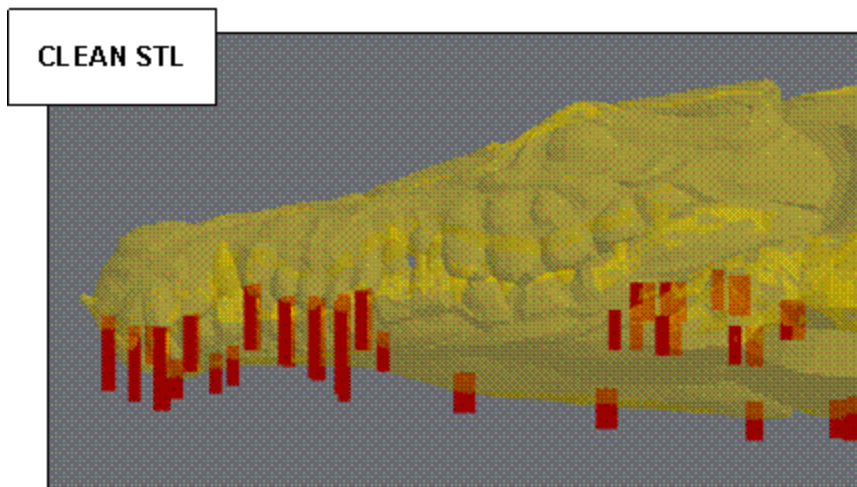
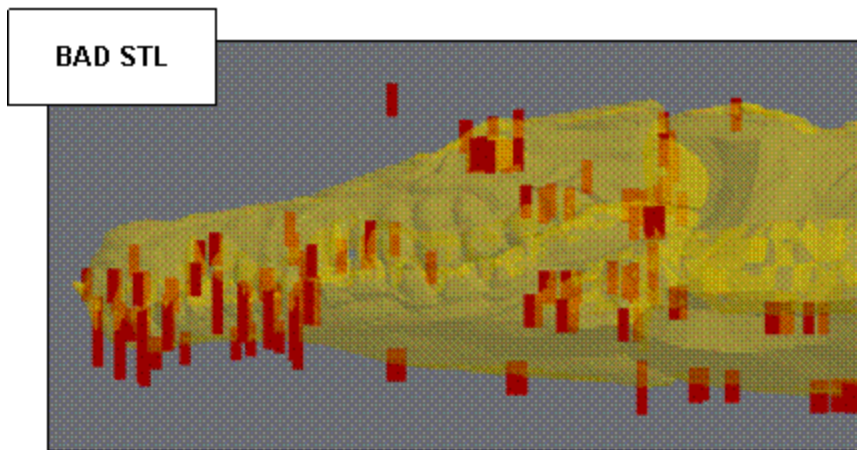
Click on the link below to view images of 'bad' STL files due to Scan STL.

[Scan STL Example](#)

[Return to STL File Issues](#)

Scan STL Example

After running the Generate and Preview Supports function in Print Preview, the support errors are shown fixed in the given images.



[Click on the link to return to Scan STL Issue](#)