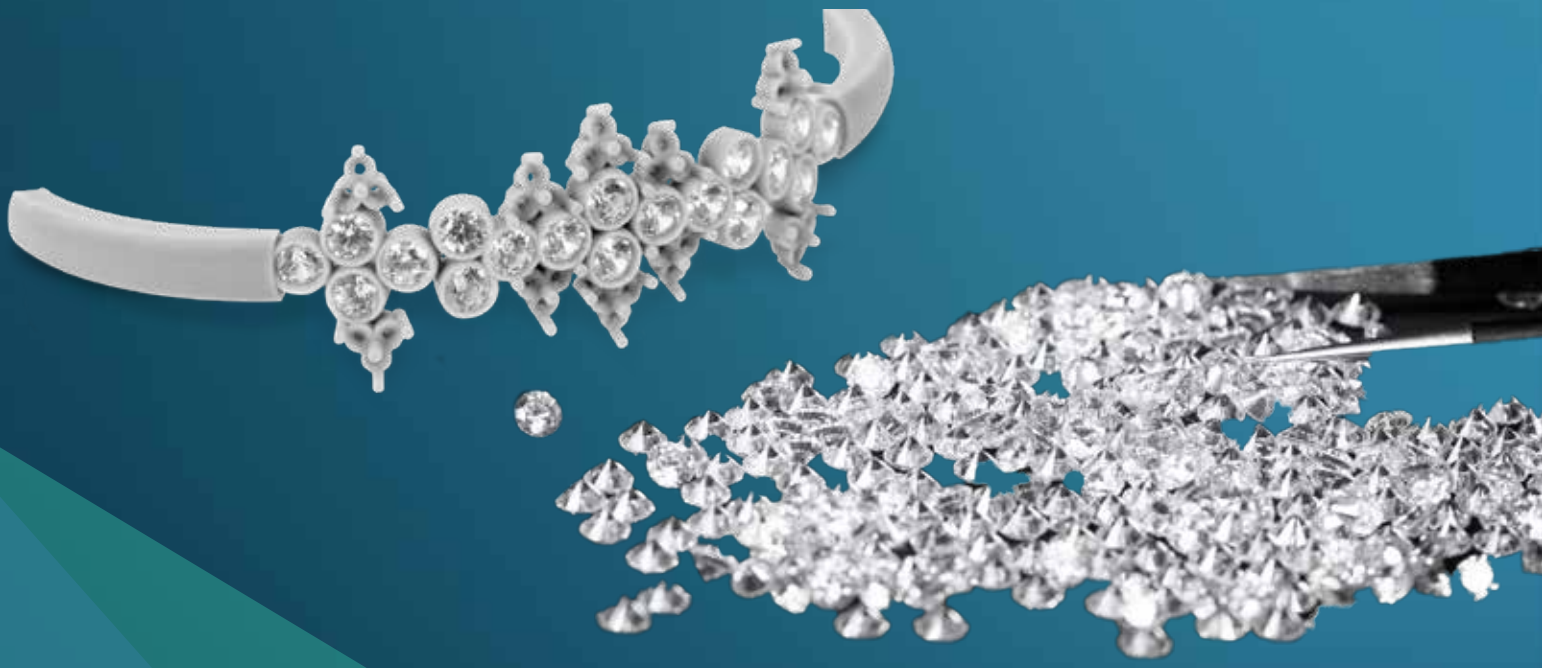
Application Brief

Jewelry Prototyping with 3D Printing

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3D SYSTEMS

Introduction

In modern jewelry design workflows, creating innovative jewelry requires the ability to evaluate a physical representation of the geometry. Jewelry prototyping with 3D printing enables designers and manufacturers to unleash their creativity through fast iteration to achieve the intended design outcome with better speed, accuracy, and confidence. This is especially important when it comes to custom designs.

Jewelry prototyping also requires testing of the functionality of a piece, placement of stones, and customer try-ons to ensure fit and satisfaction.

Uses and Examples

Jewelry models and prototypes can be used for:

- Design studies
- Aesthetic painted or plated models
- Stone setting and pavé trials
- In-store customer try-ons to ensure fit
- High temperature molding validation

Key Application Attributes & Challenges

Accuracy

- High fidelity representation of design intent
- Accuracy and material flexibility design for stone setting
- High contrast for fine detail visualization

Speed

- Fast file-to-part turnaround for design iteration and validation

Versatility

- Biocompatible material for safe extended try-ons
- Ready for painting/plating material



Advantages of 3D Printed Prototypes Using 3D Systems' Figure 4® Solution

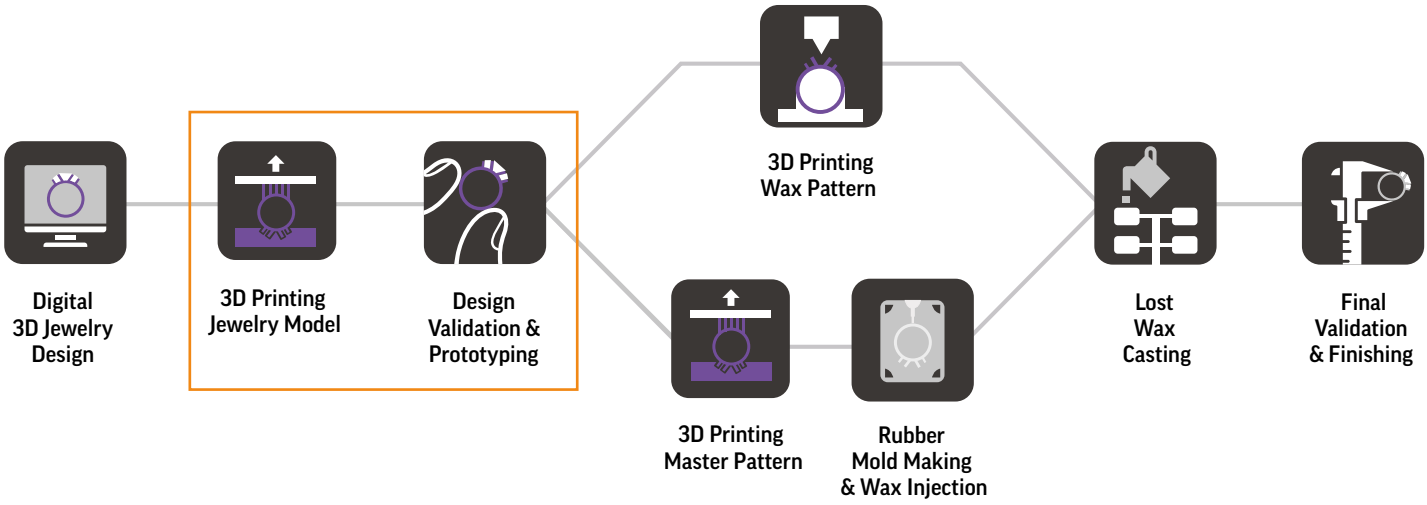
Digital solutions help designers expand their creativity and capability beyond what is possible with conventional methods by offering a way to successfully bring their ideas from concept to reality. Using a solution specifically developed for jewelry workflows helps accelerate turnaround and assure outcomes, so focus can stay on the product rather than the process. The Figure 4® Jewelry 3D printer and Figure 4 JEWEL MASTER GRY material offer jewelry-specific 3D printing build styles to address various jewelry design requirements, helping you achieve a wide range of styles. This solution allows you to:

- Go from design to prototyping in minutes—cutting significant time from conventional labor intensive processes
- Evaluate more design options
- Impress customers with accurate, precise, and beautiful jewelry models
- Increase design freedom, including thin, delicate geometries, fine mesh, and stone settings

Properties of prototypes 3D printed using the Figure 4 Jewelry solution include:

- Ultra-fast access to parts– 45 mm/hr vertical build speed
- Ultra-high detail resolution with our proprietary build styles– 30-50µm layer thickness
- High fidelity, accurate representations of digital creations – 65µm pixel pitch
- Biocompatible class VI capable material for safe handling
- Material capable of stone settings and pavé applications
- High contrast color enables better visualization
- Smooth surface finish with easy-to-remove MicroPoint™ ultra-fine support structure

3D Printed Jewelry Prototypes - Workflow Solution & Best Practices



1. Design for 3D Printing

Achieve true-to-CAD fidelity while saving time and money on even the most complex designs using the digital workflow of our Figure 4 Jewelry solution. Show off your most creative designs, including fine, filigree details.

No need for special design applications. Our 3D printing solutions are compatible with almost all CAD design software on the market using the STL file format.

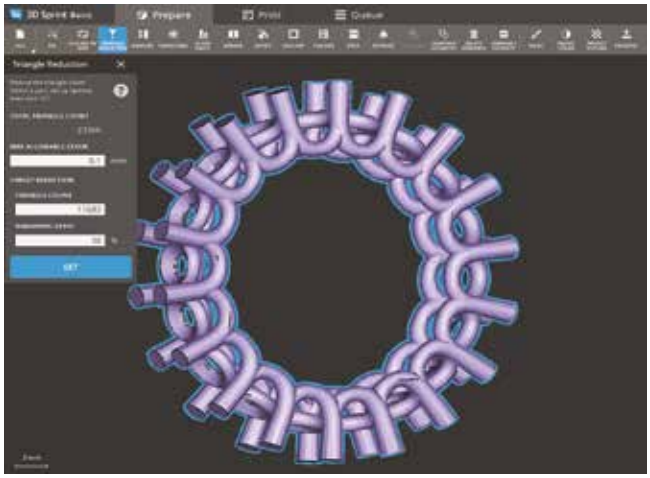


2. File Preparation

Optimized part set-up is straightforward and fast with 3D Sprint®, our print file preparation and optimization software. Easy-to-use file preparation tools including Triangle Reduction and the STL Fix Wizard help you achieve high quality and accurate printed prototypes.

TRIANGLE REDUCTION

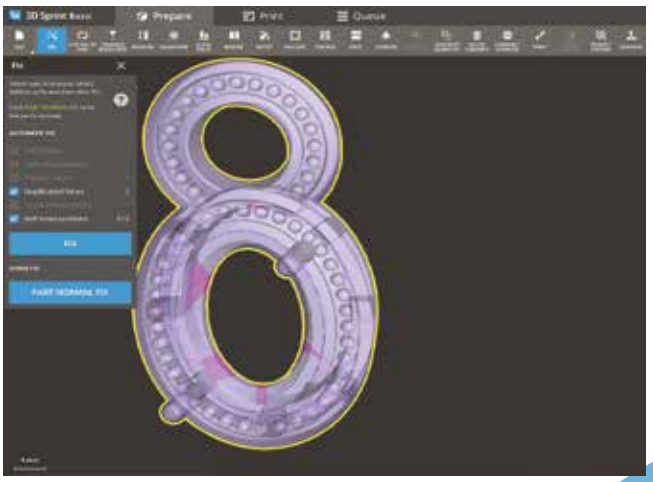
Large STL files can contain a high number of triangles. The Triangle Reduction tool in 3D Sprint's preparation tab can be very useful. Make sure to adjust the remaining ratio to maintain the surface shape and increase file processing speed.





STL FIX WIZARD

3D Sprint's preparation tab has a useful Fix Wizard tool that will help you when a part is marked in red or yellow. Fixing STL file(s) ensures a successful build and good part quality.

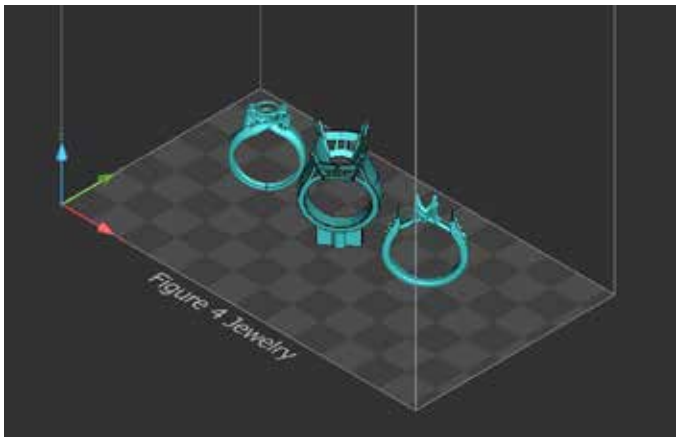


3. Printing Set Up & Parameters

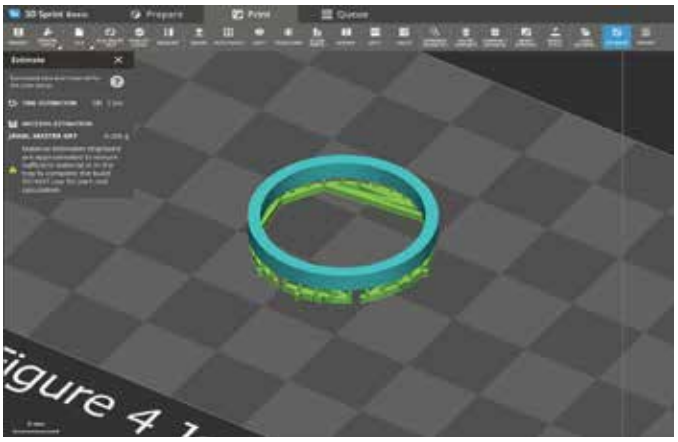
3D Sprint software provides fast and easy tools for print preparation, including automatic support generation and recommendations for part placement and orientation.

ORIENTATION

1. Orient thick parts to minimize part cross-sectional area.
2. Orient parts so part layers are mostly self-supporting during printing.
3. Orient parts so support scars are located on surfaces that will be easy to sand.
4. Increase part-base Z-height from 3 mm to 5 mm for easier cleaning and part removal.
5. Orient rings at 45-degrees to minimize pixel stepping for optimal print quality or use Auto Orientation to get the maximum speed.



Optimal print quality orientation



Maximum speed orientation

SCALE AND OFFSET WIZARD

In combination with Figure 4 JEWEL MASTER GRY material, the Prototyping print mode in 3D Sprint is designed to give you accurate prints right out of the box. Use this feature to achieve part accuracy. Further refinement of tolerances can be achieved using the Accuracy Wizard in 3D Sprint.

SUPPORT GENERATION

3D Sprint offers an automated feature for optimized support generation. Click on the Smart Support icon. Go to the Style dropdown and choose JEWEL MASTER GRY Prototyping application.

ADJUSTING CURE DEPTH

The default cure depth provides a balance of resolving both positive and negative features. For example, some ring geometries may benefit from an increased cure depth to resolve fine positive features, whereas other ring geometries may benefit from a decreased cure depth to resolve fine negative features. Click the Build Style icon to adjust cure depth for each region layer.

4. Post-Processing

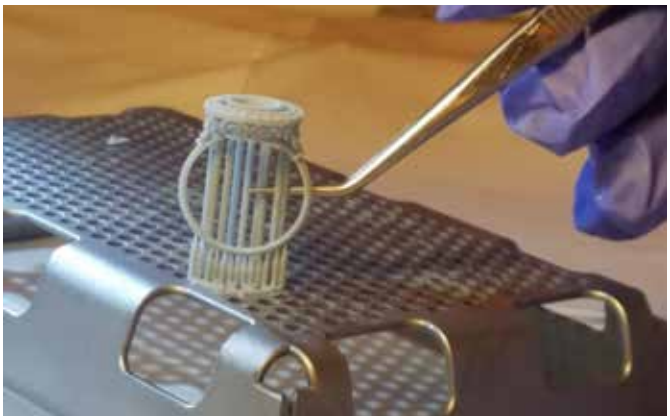
PART CLEANING

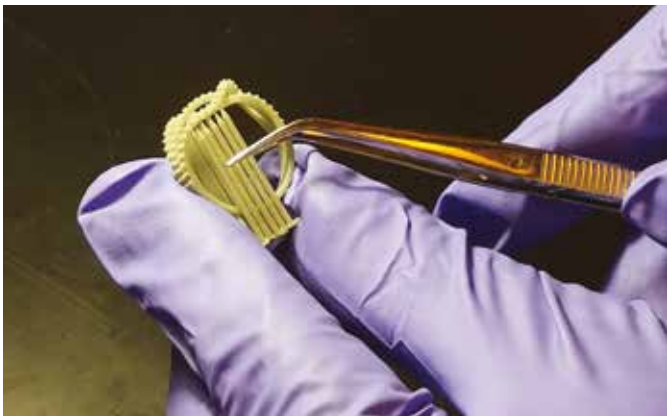
We advise cleaning parts while they are still attached to the print platform to reduce the possibility of damage while handling. This method is also faster than cleaning each part individually. Rinse for several cycles with fresh IPA and use compressed air to dislodge print material from fine features. Parts may need an additional cleaning step after removing supports if spots of print material remain.

SUPPORT REMOVAL

Remove supports from parts as soon as part cleaning is completed. This is a best practice because once parts are fully dry, support contacts strengthen slightly and may be more difficult to remove. Use tweezers to remove side supports by gently pulling them away from the part.

In some cases, it may be easier to remove parts from the print platform prior to removing the supports. Use the punch tool to detach parts from the print platform. Use tweezers to remove supports from the part.





5. Solution Components

PRINTER

The Figure 4 Jewelry 3D printer is an affordable solution optimized for jewelry design and manufacturing workflows, delivering unparalleled speed, productivity, ultra-fine detail, and smooth surface finish.

MATERIAL

Figure 4 JEWEL MASTER GRY is a high-contrast material developed to facilitate fine detail visualization, customer fittings, and stone settings, including micro-pavé.

SOFTWARE

3D Sprint is 3D Systems' advanced, single-interface software for intuitive file preparation, editing, printing, and management.

MISCELLANEOUS

LC-3DPrint Box post-curing unit is available for UV-curing parts, a necessary step for obtaining final material properties, and is the recommended UV-curing unit for Figure 4 print materials. Other post-processing supplies include a punch tool, tweezers, etc.

6. Critical Success Factors

Several factors are important to your success when going from a CAD file to a printed part. File preparation and post-processing are critical to achieving optimal results, material properties for functional performance, and fast turnaround.

Choose between the 30µm and 50µm layer thickness option depending on the expected level of resolution, surface finish, and speed.

Solutions Comparison

Benefits of 3D printing prototypes with Figure 4 Jewelry compared to wax hand carving:

- Accelerated design iteration to evaluate more creations and reduce the time from design to sale
- Dramatically increased turnaround with multiple prototypes 3D printed in minutes (see below), compared to wax hand carving
- Increased accuracy, precision, and repeatability when scaling up or down to test different sizes
- Increased design freedom with ultra-fine feature details and design styles
- Impress customers with your original designs and prototype quality
- Enable extended customer try-ons with biocompatible capable material
- Material enables more challenging snap-fit and stone-in-place testing



Wax prototype hand carving

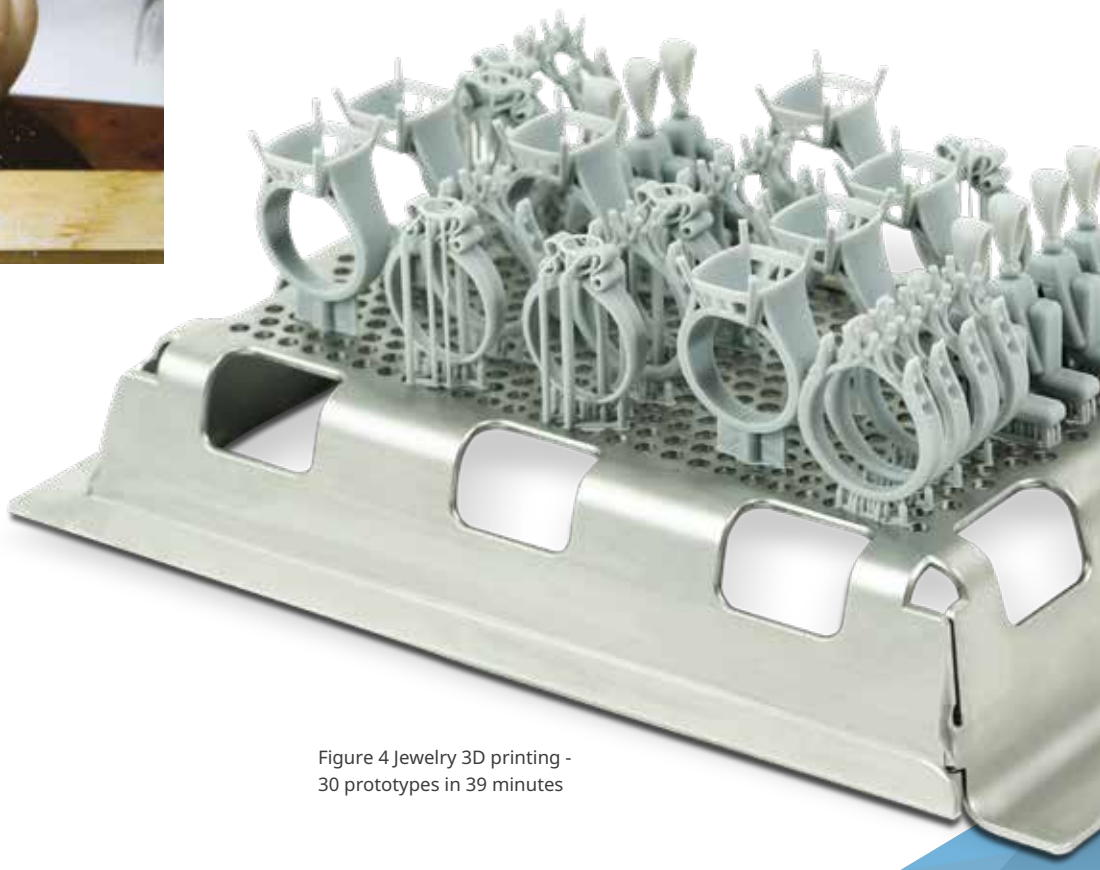


Figure 4 Jewelry 3D printing - 30 prototypes in 39 minutes

What's Next?
Learn more about our Figure 4 Jewelry solution.

Talk to an expert about your jewelry prototyping and manufacturing needs.

CONTACT US

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